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UNIVERSITY OF SUSSEX

BARNABY PAUL HOLLINGTON

SUBMISSION FOR THE DEGREE OF PHD IN MUSICAL COMPOSITION

Textual commentary:

CHORDAL ROOTS, *KLANGVERWANDTSCHAFT*, EUPHONY AND COHERENCE:

AN APPROACH TO OSTENSIBLY 'ATONAL', 'NON-TONAL' OR 'POST-TONAL'

HARMONIC TECHNIQUE

September 2017

I hereby declare that this thesis has not been and will not be submitted, in whole or in part, to another University for the award of any other degree. However, the thesis incorporates to the extent indicated below, material already submitted for the degree of Bachelor of Arts in Music in 1996, which was awarded by the University of Oxford:

21 years ago, as an undergraduate, I analysed some of the music of Pierre Boulez, and submitted my findings in a dissertation (1996). My discussion of *Répons* (1985) included the seven chords given at the bottom of p.103 of this paper ('B: actual chords'). I suggested that some of the pitches in these chords might have been derived via the process described at the top of p.104 ('C: Locked, Transposed Inversions' – pink and brown pitches). In fact, I was wrong. The actual derivation of these chords, which I finally worked out in April 2017, is described in this paper (p.103, 'A: preliminary working').

The following two statements on p.102 also repeat information provided in the 1996 dissertation. First: 'at figure 21 of Boulez's *Répons* (1985), we hear six arpeggiated chords – *u-z* in Example B below. These are related to a generative 7-note sonority.' Second (footnote 240): 'the large chord heard at 6:25 is a chord multiplication of *a*.'

The purposes of revisiting these chords were: a) to explain how I came to adopt, in my own compositions, the 'Chords of Locked, Transposed Inversion' technique discussed in pp.93-104 of this paper; b) to compare this technique with the distinct technique employed by Boulez in this instance; c) to fully acknowledge the influence of Boulez.

Signed:

Preface

The seeds of my current compositional approach were sown in 2002, with an overhaul of my former methods. Before then, certain technical shortcomings were evident in my music. I came to the conclusion that the principal underlying cause was harmonic.

The new technical foundations – in the form of a different approach to chordal spacing – were laid in *A Certain Chinese Encyclopaedia* (2003), and consolidated in *Jeux de Miroirs* (2004), *Mechanical Avunculogratitude* (2005), *Con Brio* (2006), *Magnificent Octopus* (2006), *Bagatelle* (2006), *Inventions* (2007) and *Dectet* (2008). I then all but abandoned composition for several years, until the start of my PhD studies in 2013. Since then, my methods have continued to evolve in every respect – harmony, structure, rhythm, pace, instrumentation and even dynamics. Harmony is now my strongest suit – and indeed, has been since *A Certain Chinese Encyclopaedia*. This paper deals exclusively with harmony.

That I could resume composing in earnest after a long hiatus, and embark on a PhD in 2013 was entirely thanks to the very substantial financial assistance and unwavering support of both my mother, Barbara Wootton, and her late husband Edgar Rosenberg. Thanks for guidance are due to David Horne, Ed Hughes, Stephen Soderberg and above all to my main supervisor, Martin Butler, with whom it has been an honour and a privilege to study, and to whom I am immensely grateful. Seven years passed between my original application to study with Martin and the start of my PhD research. It was absolutely worth the wait.

Summary

This submission comprises two elements:

A. A portfolio of six compositions, with a combined duration of 1:02'25":

1. *The Art of Thinking Clearly* (2013, revised 2015) for solo piano (10'10")
2. *Madame de Meuron* (2016) for orchestra (20'40")
3. *Velvet Revolution* (2014) for large ensemble (9'25")
4. *Nevermore* (2015) for quintet (4'45")
5. *Nine Dragons* (2015, revised 2017) for string orchestra (8'15")
6. *Capriccio* (2013, revised 2015) for solo violin (9'10")

B. This textual commentary, focusing on my harmonic practice. The word count is as follows:

Main text (Chapters 1-13):	35,156
Footnotes:	7,595
Bibliographies:	2,097
Total:	44,848



My harmonic approach is founded on two premises, pertaining especially to chordal spacing. First, that for each of the 4,096 possible *sets of pitch-classes* within equal temperament, without exception, certain spacing principles and techniques, if consistently applied, will generate clear, or relatively clear chordal roots. Typically, the resulting sonorities will possess more than one root – that is, be heard as polychords. Second, that one may control the level of inherent sensory dissonance of any given *set of pitch-classes*, presented as a chord, through register.

These two factors combine to induce both harmonic coherence and euphony. For most listeners, rightly or wrongly, these are not qualities normally associated with music written using the 4,096 – that is, ostensibly ‘atonal’, ‘non-tonal’ or ‘post-tonal’ music. Through my harmonic method, since chordal roots are consistently clarified, one may compose *progressions* of chordal roots – an asset on which the coherence of diatonic tonality also fundamentally depends. Within a non-diatonic context, the expressive and technical consequences are far-reaching.

The following textual commentary demonstrates all of the above, supported by analyses of numerous musical extracts. These are drawn primarily from four of the compositions included in the portfolio – *Madame de Meuron*, *The Art of Thinking Clearly*, *Velvet Revolution* and *Nevermore*.

CHORDAL ROOTS, *KLANGVERWANDTSCHAFT*, EUPHONY AND COHERENCE:

AN APPROACH TO OSTENSIBLY 'ATONAL', 'NON-TONAL' OR 'POST-TONAL'

HARMONIC TECHNIQUE

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1. Introduction: The Wider Harmonic Palette

‘My own primary way of listening, the one that gives me the most satisfaction, has to do with harmony. It is the nature of the harmony that most attracts me to a piece of music, or puts me off it... Harmony is the aspect of music that most entices me, convinces me, that most fully engages my heart and my brain in the experience of listening.’¹

‘The prerequisite of a *harmonia* is a *varietà* or *diversità* [diversity]. According to Zarlino, ... ‘harmony can arise only from things diverse, discordant, and contrary among themselves, and not from those things that agree in every respect.’² ”³

For me, harmony is the essence of musical expression – central to how I hear and conceive of music. On this most fundamental level, my ears and thoughts accord with those of the late Bob Gilmore ([2014] 2015) quoted above.⁴ If, throughout the history of Western art music, primacy had been accorded not to harmony but to timbre, as a child, I would never have felt especially drawn to music at all, let alone composition. In writing about my present creative practice, to focus on anything other than harmony would feel altogether superficial, even dishonest. It is above all on this subject, both as a composer and in writing about music generally, that I have something to say.

In the broadest possible terms, my approach to harmony stems from a modern, vastly expanded version of the Zarlinoan *varietà* principle outlined above. If ‘atonality’, ‘non-tonality’ or ‘post-tonality’ – terms that I consider problematic – could be said to possess a single, clear harmonic advantage over diatonic tonality, that advantage surely lies in immeasurably greater *varietà*. That is, in bringing all 4,096 possible *sets of pitch-classes*⁵ within equal temperament – and where feasible, microtones

¹ Gilmore, Bob: ‘NMC Friend and Musicologist Bob Gilmore shares his thoughts on listening’, in *NMC Recordings* Feature, [2014] 5 January 2015 [online]. <<https://www.nmcrc.co.uk/news/bob-gilmore-1961-2015>>. This webpage – and all other online resources – accessed 18.8.2017.

² Zarlino, Gioseffo (1558), quoted in Dahlhaus, Carl, transl. Robert O. Gjerdingen ([1966] 1990) – see footnote 3 below. See also Zarlino, Gioseffo: *The Art of Counterpoint* – Part Three of *Le Istitutioni Harmoniche*, transl. Guy A. Marco and Claude V. Palisca, New Haven and London: Yale University Press ([1558] 1968), p.59.

³ Dahlhaus, Carl: *Studies on the Origin of Harmonic Tonality*, transl. Robert O. Gjerdingen, Princeton: Princeton University Press ([1966] 1990), p.21.

⁴ Beyond this point, I disagree with Gilmore on several important harmonic subjects, but that is another matter.

⁵ The widely-used term ‘pitch-class set’ is a misnomer, since it does not designate a specific *set of pitch-classes* – rather, effectively a set of adjacent *interval-classes*. For our purposes, ‘*set of pitch-classes*’ signifies a set such as [C, C#, D, E], and not a Forte so-called ‘pitch-class set’.

– into one’s harmonic language, one maximises the potential for heterogeneity and contrast. It is for this reason that, within the practical confines of equal temperament,⁶ my harmonic writing encompasses each and every one of the 4,096 *sets of pitch-classes*, and in principle any conceivable successions of such sets.

From this, in theory, the allure of building compelling dialogues between an exhilarating array of ‘things diverse, discordant and contrary amongst themselves’ ought to dwarf that of diatonic tonality, with its far more restricted range of available harmonic colours. In practice, of course, matters are not so simple. Far from it. It is a truism to state that, globally, for many composers and for the overwhelming majority of listeners, diatonic tonality holds by far the greater appeal.

For those of us who choose the other route, the mere act of accessing this wider, ostensibly ‘atonal’, ‘non-tonal’ or ‘post-tonal’ vocabulary of *sets of pitch-classes* will not in itself facilitate fuller harmonic expression. Indeed, potentially, quite the opposite. Heard strictly as harmony, that wider vocabulary poses immense technical and aesthetic challenges to a composer, far above and beyond any that one encounters within the limits of tried-and-tested diatonic grammar. I hold that, to truly earn the right to use such an extended palette of harmonic colours, one must endeavour towards eloquent, flexible, thoroughly secure and comfortable control over them. Of course, as has been very well documented, ever since Schoenberg’s first forays into so-called ‘atonality’, this aspect has remained enormously problematic.

Henceforth, I shall refer to the total harmonic vocabulary defined above, minus microtones, in neutral terms as ‘*the 4,096*’ – that is, the 4,096 possible collections of pitch-classes within equal temperament.⁷ The 4,096 are not, by nature, ‘atonal’. Nor are they inherently ‘non-tonal’, ‘post-tonal’ or ‘pantonal’; still less ‘tonal’ in any useful sense of the term. The potential range of harmonic

⁶ I have also experimented a little beyond the boundaries of equal temperament in one recent composition, not included in this portfolio.

⁷ In theory, many of the principles and techniques discussed in this paper could also be applied to microtones. But for our purposes, since my music rarely features microtones, the emphasis is firmly on equal temperament.

expression that the 4,096 can facilitate greatly exceeds the boundaries defined by any of those labels. However, one might perhaps meaningfully employ such terms to designate a range of compositional *stances* towards the 4,096. In very general terms, one can identify an *atonal* stance, a *non-tonal* stance, a *post-tonal* stance and a *pantonal* stance. Some works may have been conceived from one stance only; others might combine several stances.

I advance that a genuinely *atonal* or *near-atonal* stance is that in which the composer all but avoids meaningful treatment of pitch altogether. The listener's attention is then directed towards another element – often timbre. Iancu Dumitrescu's *Hyperspectres* (2011),⁸ for example, consists almost solely of timbre, texture and dynamics, with only two clearly-defined pitches. John Cage's *Imaginary Landscape n°4* for 12 radios (1951)⁹ will typically include very few discernible pitches, with those that do occur sounding by chance. Poietically,¹⁰ in this work, Cage has barely given heed to pitch at all. In Nathaniel Mann's *Pigeon Whistles* (2013),¹¹ again, pitch has been considered only minimally. Mann attaches whistles to a group of pigeons. As they fly, we hear a drone chord that shifts up or down within the range of a semitone when the birds change direction: that is all.

Such music marks a near-extreme. At the very extreme, only those works that exclude pitch altogether, such as Salvatore Sciarrino's *...da un Divertimento* (1970)¹² or Paul McGuire's *Panels* (2014),¹³ can unambiguously be termed *atonal*. In this, I am echoing Richard Parncutt (2009)'s pronouncement that 'music composed of *tones* (in the psychoacoustical sense of *sounds that have*

⁸ Dumitrescu, Iancu: *Hyperspectres* [2011], online video (26.8.2013): <<https://www.youtube.com/watch?v=WdFOYM2s6PI>>. This video – and all other online resources – accessed 18.8.2017.

⁹ Cage, John: *Imaginary Landscape n°4* for 12 radios [1951], online video (7.9.2012): <<https://www.youtube.com/watch?v=oPfwrFl1FHM>>.

¹⁰ 'Poietic' or 'poietically', in this context, signifies 'from the composer's perspective, during the process of composition.'

¹¹ Mann, Nathaniel: *Pigeon Whistles* [2013], online video (28.5.2013): <<https://www.youtube.com/watch?v=KzISHztA-14>>.

¹² Sciarrino, Salvatore: *...da un Divertimento* [1970], Milan: Ricordi – n°131619 (1973). I know of no recording of this work, online or otherwise. I have heard the work only once, performed live by the Aurora Orchestra at the Wigmore Hall on 2.11.2013.

¹³ McGuire, Paul: *Panels* [2014], online audio extract (3.10.2014): <<https://soundcloud.com/nmcrecordings/paul-mcguire-panels-extract>>.

pitch) can never be completely atonal.¹⁴ Cage heard ‘atonality’ as a ‘denial of harmony’.¹⁵ Each of the works listed above amounts to just that. Such an approach is valid. But this marks the very opposite of what interests me as a creative practitioner.

By contrast, music conceived from a *non-tonal* stance to the 4,096 *affirms* an expressive, colouristic and structural purpose for pitch, and for harmony, albeit still without sharing much substantial common ground with diatonic tonality. Hitherto, of the various categories proposed here, the *non-tonal* stance has represented the default position for most music featuring the 4,096, encompassing more than a century of stylistic evolutions from the Second Viennese School through to Harrison Birtwistle’s *The Moth Requiem* (2012),¹⁶ most of Brett Dean’s *Electric Preludes* (2012),¹⁷ much of Unsuk Chin’s *Mannequin* (2014)¹⁸ and many other contemporary scores.

In this context, spectralism, in its various guises, forms a curious subcategory. In practice, most works labelled ‘spectral’ do not relegate pitch and harmony to a negligible role. Compositions such as *Hyperspectres* are the exception, not the norm. More representative are works such as Tristan

¹⁴ Parncutt, Richard: ‘Tonal Implications of Harmonic and Melodic T_n-Types’ in *Mathematics and Computing in Music*, ed. Timour Klouche and T.Noll, Berlin: Springer (2009), p.124.

Parncutt does not claim this inference as his own, referring the reader to Rudolph Reti’s *Tonality, Atonality, Pantonality*, London: Rockliff (1958), without specifying the page number. I can find nothing within *Tonality, Atonality, Pantonality* that veritably corresponds with Parncutt’s statement – with which I fully agree. Reti describes the term ‘atonality’ as a ‘misnomer’ and a ‘gross exaggeration’ (p.2), but his argument stops far short of Parncutt’s claim quoted above.

¹⁵ Cage, John: ‘Forerunners of Modern Music’ [1949] in *Silence: Lectures and Writings*, Middletown, Conn.: Wesleyan University Press (1961), p.63.

To be exact, Cage defined atonality as ‘the denial of harmony *as a structural means*.’ [My italics.] But this does not bear scrutiny: in practice, ‘atonality’ would then amount to ‘the denial of harmony’ *altogether*. Cage claims to hear ‘harmonic structure’ purely in terms of ‘the cadence, and modulating means’ [ibid., p.63]. But other forms of ‘harmonic structure’ are not only possible but nigh-on inevitable. Since music exists in time, any expressive or colouristic use of harmony will always be heard structurally in one manner or another, whether the composer has acknowledged this reality or not. In practice, one can only deny harmony ‘as a structural means’ by atrophying the role of harmony, and indeed pitch, altogether. That, I propose, is the *atonal* stance.

¹⁶ Birtwistle, Harrison: *The Moth Requiem* [2012], online video (19.8.2013): <<https://www.youtube.com/watch?v=rO7sKJrzVC0>>.

¹⁷ Dean, Brett: *Electric Preludes* [2012], online audio (4.10.2014): <https://www.youtube.com/watch?v=UwN_hd9qB88>.

¹⁸ Chin, Unsuk: *Mannequin* [2014], online audio (10.4.2015): <<http://5against4.com/2015/04/10/unsuk-chin-mannequin-world-premiere/>> FLAC file (scroll down).

Murail's *Gondwana* (1980),¹⁹ Kaija Saariaho's *Nymphea* (1987)²⁰ and Joshua Fineberg's *Streamlines* (1994),²¹ each of which is *non-tonally* conceived – or else Georg Friedrich Haas's *In Vain* (2000),²² which is largely *post-tonally* conceived, in the sense to be shortly clarified. And yet the writings of Hugues Dufourt ([1991] 2014), Viviana Moscovich (1997), Fineberg (2006) and certain other advocates of spectralism would appear to uphold a *near-atonal* stance to the 4,096:

'Was it a case of an emancipation of dissonance, as is still [commonly] claimed today, or an *emancipation of timbre*? [My italics]... Musicologists refer constantly and exclusively to organisations of pitches to describe an artistic phenomenon which precisely calls into question the pre-eminence of pitches in the hierarchy of musical parameters... [It is] not the notion of dissonance that is in question, but the primacy of pitches in the traditional order of constituent properties of musical language.'²³

'In spectral music, the spectrum – or group of spectra – replace harmony, melody, rhythm, orchestration [*a puzzling inclusion, given the author's championing of timbre elsewhere in the same paper*] and form.'²⁴

'The "spectral approach"... is built around the idea that writing music is not just pushing around tunes, intervals, numbers, or harmonies.'²⁵

'I might assert that... [spectral] music has made color into a central element of the musical discourse, often elevating it to the level of the principal narrative thread...'²⁶

According to all three authors, in spectral music, timbre is paramount. Granted, Fineberg qualifies the last statement quoted above: 'While examples could be found to support... [this], counterexamples could certainly be found.'²⁷ But in truth, among compositions commonly labelled

¹⁹ Murail, Tristan: *Gondwana* [1980], online audio (5.1.2013): <<https://www.youtube.com/watch?v=X4Elx0XzPzg>>.

²⁰ Saariaho, Kaija: *Nymphea* [1987], online video (1.10.2014): <<https://www.youtube.com/watch?v=IUEGfwZRYPg>>.

²¹ Fineberg, Joshua: *Streamlines* [1994], online audio excerpt: <<https://joshuafineberg.com/listen/>>.

²² Haas, Georg Friedrich: *In Vain* [2000], online video (9.2.2017): <<https://www.youtube.com/watch?v=ZAwvWLVfSkM>>.

²³ Dufourt, Hugues: *Musique, Pouvoir, Écriture*, Rhône-Alpes: Delatour ([1991] 2014), pp.375-376. My translation. Dufourt's text reads: 'S'agissait-il d'une émancipation de la dissonance, comme on continue à le prétendre encore aujourd'hui, ou d'une émancipation du timbre?... Les musicologues se réfèrent constamment aux seules organisations de hauteurs pour rendre compte d'un phénomène artistique qui, précisément, remet en cause la pré-éminence des hauteurs dans la hiérarchie des paramètres musicaux... [Ce n'est] pas la notion de dissonance qui est en cause, mais bien la primauté des hauteurs dans l'ordre traditionnel des propriétés constitutives du langage musical.'

²⁴ Moscovich, Viviana: 'French Spectral Music: an Introduction' in *Tempo*, n°200 (April 1997), pp.21-22.

²⁵ Fineberg, Joshua: *Classical Music, Why Bother?*, London and New York: Routledge (2006), p.109.

²⁶ Ibid., p.122.

²⁷ Ibid., p.122.

‘spectral’, one finds a preponderance of ‘counterexamples’ – such as *Gondwana*, *Nymphaea*, *In Vain* and *Streamlines* –, and, I contend, very few authentic ‘examples’. Indeed, I submit that, besides *Streamlines*, among the other 16 excerpts from Fineberg’s own music provided on the same webpage at the time of writing, only twice does timbre genuinely outweigh pitch, to form the ‘principal narrative thread’ for any significant stretch.²⁸ The first case is the straightforwardly *atonal* opening 40 seconds or so of the first of three extracts from *Lolita – an imagined opera based on the novel by Vladimir Nabokov* (2008). The second instance occurs around four minutes into the third extract from the same work, lasting perhaps 30 seconds or so. I advance that in spectral music, where both pitch and timbre are present, our ears are drawn towards pitch to a far greater extent than Fineberg, Dufourt ([1991] 2014) or Moscovich (1997) admit.

Dufourt goes further still, presenting an idiosyncratic, revisionist view of the history of early twentieth-century music, in which the innovations of Debussy, Schoenberg, Stravinsky and Webern are repackaged as principally timbral,²⁹ triggering an inexorable teleological process that neatly and conveniently leads to spectralism³⁰ – a term coined, of course, by himself (1979).³¹ By spinning Schoenberg’s own phrase – now ‘emancipation of *timbre*’ – and admonishing unnamed commentators for placing too much emphasis on pitch in discussing such music, Dufourt appears to imply that Schoenberg, as a markedly pitch-oriented theorist, must have failed to grasp that his own ostensibly ‘atonal’ compositions supposedly place timbre in the foreground, and consign pitch and harmony to a diminished role. Of *Erwartung* (1909), for example, Dufourt claims:

*‘The atonality... above all designates a new way of treating timbre... [My italics.] The fabric of sound, here, is defined less by the progression of pitch or harmonic content than by the instrumental combinations characterising each moment. No longer subordinate to pitch, timbre follows its very own logic.’*³²

²⁸ Fineberg, Joshua: <<https://joshuafineberg.com/listen/>>, accessed 18.8.2017.

²⁹ Dufourt, Hugues : op.cit. ([1991] 2014), pp.374-379.

³⁰ Ibid., pp.380-392.

³¹ Dufourt, Hugues: ‘Musique Spectrale’ in *Société Nationale de Radiodiffusion, Radio France/ Société Internationale de Musique Contemporaine*, n°3 (1979), pp.30-32.

³² Dufourt, Hugues: op.cit. ([1991] 2014), p.377. My translation. The original reads: ‘L’atonalité d’*Erwartung*... désigne surtout une nouvelle façon de traiter les timbres... Le tissu sonore s’y définit moins par l’évolution des

On the contrary, we can conclusively establish that in listening to *Erwartung*, our musical attention is drawn primarily to ‘progression of pitch’, and only secondarily to timbre. For one thing, one cannot help but focus on the singer, and therefore, on a musical level, follow her melodic line.³³ To fail to do so would be to ignore the inflections with which she delivers her very words, and therefore to miss the very substance of the monodrama. Timbre can only be secondary to that – which is not to deny that Schoenberg’s treatment of timbre is nonetheless absorbing in itself. Moreover, besides the singer’s melodic lines, there is an abundance of other melodic figures and harmonies elsewhere in the texture, throughout the work, which one cannot help but take in.

Not only do Schoenberg’s writings tend to focus on pitch and harmony – they explicitly contradict Dufourt’s spin that from 1908 onwards,³⁴ timbre is supposedly ‘no longer subordinate to pitch’. Among Schoenberg’s infrequent, fleeting allusions to timbre, we find statements such as:

‘I do not wish to be a killjoy, but I must confess that I find the delight in colors somewhat overrated. Perhaps the art of orchestration has become too popular.’³⁵

‘The childish preference of the primitive ear for colors has kept a number of imperfect instruments in the orchestra, because of their individuality. More mature minds resist the temptation to become intoxicated by colors and prefer to be coldly convinced by the transparency of clear-cut ideas.’³⁶

From these and other similarly forthright assertions, there can be no doubt as to Schoenberg’s position regarding the relative importance of pitch and timbre. With respect to Dufourt, I do not use the term ‘revisionist’ without foundation. Schoenberg’s innovations were above all *harmonic*.

In arguing that through the very act of expanding one’s harmonic palette to include the 4,096, one must supposedly relegate harmony to a subsidiary role, behind timbre, Dufourt’s reasoning parallels

hauteurs ou des contenus harmoniques que par la combinaison instrumentale qui caractérise chaque moment. Cessant d’être subordonné à la hauteur, le timbre poursuit sa logique propre.’

³³ Schoenberg, Arnold: *Erwartung*, op.17 [1909], online audio (2.11.2016): <<https://www.youtube.com/watch?v=7RShFr17J8M>>.

³⁴ Dufourt, Hugues: op.cit. ([1991] 2014, pp.377-378.

³⁵ Schoenberg, Arnold: ‘Eartraining through Composing’ [1939] in *Style and Idea*, ed. Dika Newlin, New York: Philosophical Library (1950), p.151.

³⁶ Schoenberg, Arnold: ‘Composition with Twelve Tones [1941] in *Style and Idea*, ed. Dika Newlin, New York: Philosophical Library (1950), pp.130-131.

Cage's 'denial of harmony'. I submit that such specious rationalisations are a symptom of a deeper problem: that few composers, whether spectral or non-spectral, have yet found the technical means to write truly gratifying harmony using the 4,096. Further, I propose that harmony is the primary reason why, for the most part, ostensibly 'atonal', 'non-tonal' or 'post-tonal' music has attracted far fewer listeners than it otherwise would have done. By downplaying the role of harmony in their music and aggrandising the status of timbre, certain composers may have convinced themselves that the problem no longer exists. The fact is: one still hears harmony in Grisey, Murail, Saariaho, Haas, Fineberg and Dufourt. Granted, in certain spectral sonorities, harmony and timbre *begin* to fuse. But in most spectral scores, most of the time, harmony is nevertheless heard independently of timbre, and therefore matters on its own terms, just as it does in other *non-tonally*-conceived music.

There are, of course, other harmonic approaches to the 4,096. I advance that music written from a *post-tonal* stance, properly speaking, is that which incorporates clearly diatonic or near-diatonic elements within an otherwise *non-tonally*-conceived context – or else, less commonly, within an *atonally*- or *pantonally*-conceived³⁷ context. Obvious examples include the third movement of Berio's *Sinfonia* (1968),³⁸ parts of Peter Maxwell Davies's *Eight Songs for a Mad King* (1969),³⁹ some of Kurtág's *Twelve Microludes (Hommage à Mihály András)* (1978),⁴⁰ one section of Wolfgang Rihm's *IN-SCHRIFT* (1995),⁴¹ most of Haas's aforementioned *In Vain* (2000)⁴² other than the first ten minutes or so, and three passages from Dean's aforementioned *Electric Preludes* (2012).⁴³

³⁷ The *pantonal* stance will be defined shortly.

³⁸ Berio, Luciano: *Sinfonia* [1968], online video (25.5.2015): <<https://www.youtube.com/watch?v=JwJHu2gSj1A>>, 12:42-25:15.

³⁹ Davies, Peter Maxwell: *Eight Songs for a Mad King* [1969], online video (4.4.2015): <<https://www.youtube.com/watch?v=m6357vL9TPg>>, 3:57-4:06, 11:07-12:28, 14:55-16:40, 18:57-22:35 and elsewhere.

⁴⁰ Kurtág, György: *Twelve Microludes (Hommage à Mihály András)* [1978], online video (16.6.2012): <<https://www.youtube.com/watch?v=ekTnQdFnXeo>>. The most striking examples occur in Microludes V (2:05-3:36) and VI (3:45-4:39).

⁴¹ Rihm, Wolfgang: *IN-SCHRIFT* [1995], online video (29.11.2013): <<https://www.youtube.com/watch?v=i62K43AI4ro>>, 9:48-11:42. We shall consider this post-tonal episode again in Chapters 3 and 11.

⁴² Haas, Georg Friedrich: op.cit. ([2000] 2017).

⁴³ Dean, Brett: op.cit. ([2012] 2014), 0:00-1:25, 11:52-13:15, 21:22-22:04.

All six compositions included in this portfolio include occasional, short pockets of diatonic material, and therefore, at these points, indicate a *post-tonal* stance. In *Nevermore*, I invert the far more common practice of placing either a direct quotation from the diatonic repertoire, or else a pastiche of a particular diatonic idiom, in a non-tonally-conceived context. The former dominate the third movement of *Sinfonia*⁴⁴ cited above; the latter abound in *Eight Songs for a Mad King*. Conversely, the quotations in *Nevermore* are of a single ostensibly ‘non-tonal’ chord from Boulez’s *Dérive 1* (1984);⁴⁵ the material composed directly around it is largely diatonic. Furthermore, I do not treat the *Dérive 1* chord as a detached, foreign *objet sonore*, but allow it to adapt seamlessly to its new diatonic context. It takes on a very straightforward, readily intelligible syntactical role:⁴⁷

Nevermore
p.3, b.34-37

34 ♩ = 60

The musical score is for a piece titled 'Nevermore', page 3, measures 34-37. It is in 2/4 time with a tempo of 60 beats per minute. The score is written for piano and violin. The piano part has a complex texture with many notes, and a specific section is highlighted with a box. The violin part has a melodic line with a slur. The score includes measure numbers 34, 35, 36, and 37. The piano part has a 'Ped.' marking under measure 34. The violin part has a 'Boulez' marking above measure 35.

A hypothetical listener, having heard *Nevermore*, upon subsequently hearing *Dérive 1*, might well, to some degree, consciously or otherwise, continue to hear the same diatonic implications from the

⁴⁴ Granted, the movement includes some non-tonally-conceived quotations – but the vast majority are diatonic.

⁴⁵ Boulez, Pierre: *Dérive 1* [1984], online video (1.5.2012): <<https://www.youtube.com/watch?v=RZDKMVqkbpQ>>. The chord sounds at 0:19-0:23, 5:18-6:14,⁴⁶ and elsewhere in the piece.

⁴⁶ For the corresponding points in the score, see Boulez, Pierre: *Dérive 1* [1984], Vienna: Universal Edition – UE 18103 (1984), p.1, b.1 and pp.15-17, b.46-54.

⁴⁷ The chord is evidently Boulez’s, down a 5th. The figuration is my own. The above excerpt from p.3, b.34-37 of *Nevermore* corresponds to 1:07-1:17 of the audio file.

chord in question. Boulez may have conceived of the chord from an essentially *non-tonal* stance, but it does not follow that the chord can only be heard non-tonally.

I submit that, whether or not the diatonic or near-diatonic elements amount to direct quotations, music written from a *post-tonal* stance often appears to place all of diatonic tonality itself in quotation marks: an ancestral object to be juxtaposed, superimposed, prodded and apprehended from a post-modern distance. That is one way of dealing with those sonorities among the 4,096 possessing clear diatonic implications. To me, it is not necessarily always the most interesting or satisfying way. I normally seek far more organic methods of embedding such sonorities. This is a hallmark of a *pantonal* stance. It is from such a stance that most of my harmony is written.

Like so many other musical terms, there are several conflicting definitions of ‘pantonicity’. The theories underpinning these various definitions are best examined in the light of a thorough understanding of my own harmonic methods. For this, there is no shortcut. The workings of these methods will be explored, starting from first principles, between Chapters 5 and 11 – the main body of this paper. We can then dissect the various ‘pantonal’ concepts from a much clearer technical vantage point in Chapter 12. For the time being, in seeking to define a pantonal stance *to the 4,096*, we shall consider only a single conception of ‘pantonicity’ – that of Rudolph Reti (1958):

‘The characteristic attribute of pantonicity, ... through which it becomes a truly new concept and not merely an increased expression of classical tonality, is the phenomenon of ‘movable tonics’, that is, a structural state in which several tonics exert their gravitational pull simultaneously, counteractingly as it were, regardless of whether any of the various tonics ultimately becomes the concluding one.’⁴⁸

‘In the pantonal picture much of the atonal fabric, many of the melodic figurations and chordal combinations of atonality – indeed, of atonality, not of simple chromaticism – can be and usually are included. Yet the significant point is that the composer still does not use this material to develop an atonal picture..., but rather uses the atonal figurations to form those new constructions just described in which a diversity of tonical impulses elevates the atonal shapes to a design of uninterrupted coherence.’⁴⁹

⁴⁸ Reti, Rudolph: *Tonality, Atonality, Pantonicity*, London: Rockliff (1958), p.67.

⁴⁹ Ibid., pp.68-69.

I contend that the extent to which the three specific musical examples listed by Reti (1958) as illustrations of ‘pantonality’ – by Ives, Bartók and himself – genuinely feature ‘the melodic figurations and chordal combinations of atonality’ is rather limited in practice.⁵⁰ The second quotation given above – in isolation – would seem to fit more closely, in fact, to my own music, than to the body of music it seeks to describe. Due to notable divergences among many authors⁵¹ on the subject of ‘tonality’, including Reti,⁵³ I intend to steer clear of terms such as ‘tonical impulses’ or ‘movable tonics’, but the gravitational phenomena that Reti describes are readily audible in all of my scores, albeit often in ways that Reti did not envisage.

Indeed, my approach to harmony allows not only ‘many’ but *all* ‘chordal combinations of atonality’ to operate gravitationally. At the very least, my music represents a broadly pantonal *stance* to the 4,096. Whether it fully qualifies as pantonal is a relatively minor concern.⁵⁴ Far more important are the *technical means* through which I induce true harmonic momentum through ostensibly ‘atonal’⁵⁵ material. These depend above all on a single factor: the consistent clarification of chordal roots. If roots are not rendered sufficiently audible, I contend that genuine harmonic gravitation is impossible. At least, I can hear no other way. The principle is essentially neo-Rameauan. That is: having sufficiently clarified a succession of chordal roots, one may obtain

⁵⁰ The matter will be considered more closely in Chapter 12.

⁵¹ These include, but are by no means limited to, Hugo Riemann and François-Joseph Fétis. Dahlhaus ([1966] 1990) writes: ‘Scholars could have either reverted to Fétis’s term, which included all *types de tonalités*, and abandoned Riemann’s interpretation, or, conversely, clung to Riemann’s equation of tonality with the three-function schema and designated as “tonal” only the harmony of the 17th through the 19th century. But since neither possibility was dropped, the term “tonality” became ambiguous.’⁵²

⁵² Dahlhaus, Carl: *Studies on the Origin of Harmonic Tonality*, transl. Robert O. Gjerdingen, Princeton: Princeton University Press ([1966] 1990), pp.16-17.

⁵³ To my mind, both the musical analysis and the logic through which Reti distinguishes ‘melodic tonality’ from ‘harmonic tonality’ are open to question. See Reti, op.cit. (1958), pp.15-30 and 133-135. We shall return to the subject in Chapter 12, and consider an alternative technical and terminological angle.

⁵⁴ In Chapter 12, after having thoroughly examined my harmonic methods, we shall consider the separate definitions of ‘pantonality’ of Schoenberg and Russell, and revisit that of Reti. From that standpoint, one might perhaps then make a plausible case that my music is fully pantonal in any of the three senses. But I see no pressing need to do so, and prefer to keep the matter open.

⁵⁵ That is, ‘atonal’ in the broad sense implied by Reti, rather than in the strict sense defined here. (See this paper, pp.3-4). Furthermore, despite his frequent use of the term, Reti is clearly uncomfortable with it, branding it ‘a misnomer... – a gross exaggeration.’ See Reti, op.cit. (1958), p.2. See also this paper, p.4, footnote 14.

something partially comparable to a Rameauan *basse fondamentale*.⁵⁶ The sonorities and techniques differ markedly from Rameau, but this is nonetheless one of several notable correspondences with Rameauan harmonic theory. In Chapters 5 and 6, I will demonstrate that via certain techniques of chordal spacing, one may generate true, audible roots from within any *set of pitch-classes* among the 4,096, without exception.

It is above all the establishment of chordal roots that distinguishes the *pantonal* stance from the various others described above. George Perle ([1962] 1991) identifies ‘the abandonment of the concept of a root-generator’⁵⁷ as a central feature of what he terms ‘atonality’. Granted, it is perfectly legitimate for an individual composer, in embracing the 4,096, to choose to abandon chordal roots. But I maintain that to date, most composers have not done so by choice, but by necessity, owing to technical and theoretical limitations. I contend that it is possible to compose with the 4,096, whilst systematically and consistently anchoring chords to roots. In practice, this proves a formidable grammatical and structural asset.

Poietically,⁵⁸ in most cases, one establishes multiple roots, rather than a single root. That is, if treating a *set of pitch-classes* as a chord, one generates a *poietic* polychord. Whether that polychord is then *aesthetically*⁵⁹ heard as such is another matter. Typically, within a polychord, I hear some roots more strongly than others. I suspect that some listeners, consciously or otherwise, might only perceive a single root – the strongest – where other listeners, like me, perceive two or more. The question will be explored a little further in Chapter 5, but the main focus of this paper is on my harmonic techniques. I advance that since diatonic tonality depends on ‘the progression of chordal

⁵⁶ ‘The progression of chordal roots – *centres harmoniques* – forms a *basse fondamentale* distinct from the actual bass voice (the *basso continuo*). And it is the *basse fondamentale* that must be understood as the hidden foundation of harmonic progression.’ Dahlhaus, Carl: op.cit. ([1966] 1990), p.23.

⁵⁷ Perle, George: *Serial Composition and Atonality: an Introduction to the Music of Schoenberg, Berg and Webern*, Berkeley and Los Angeles: University of California Press ([1962] 1991), p.31.

⁵⁸ See this paper, p.3, footnote 10.

⁵⁹ ‘*Aesthetic*’ or ‘*aesthetically*’, in this context, denotes ‘from the listener’s perspective’ – the antonym of ‘*poietic*’.

roots'⁶⁰ to establish tonics, in theory, the 'several tonics'⁶¹ that Reti describes could only exist where one could also hear multiple simultaneous roots, consciously or otherwise.

At first glance, *on the page*, like my 'chordal combinations',⁶² many of my 'melodic figurations'⁶³ would also seem ostensibly 'atonal' in Reti's terms – at times reminiscent of, say, Donatoni. But again, by fairly similar means to those described above, in aural reality, they acquire a degree of gravitational potency and meaning that typically remains unattainable in music composed from a *non-tonal* stance. Mostly unattainable also in *post-tonally*-conceived music, outside of the more obviously diatonic 'figurations'. (Evidently, music composed from an *atonal* stance, by my definition, forbids 'melodic figurations' in the first place.) I will demonstrate this approach to melodic writing in Chapter 9.

Moreover, I contend that through the same principle, both my 'chordal combinations' and my 'melodic figurations' are rendered appreciably more euphonious than they otherwise would have been. This occurs partly as a by-product of some of the techniques alluded to above, and partly via certain additional techniques of chordal and linear spacing. I thereby maintain very close control over levels of sensory dissonance⁶⁴ at all times, for both expressive and structural purposes. The concept and relevant techniques will be examined primarily in Chapters 3 and 5.

Of course, I am far from the first composer to seek to exploit chordal roots outside of diatonic harmony. Certain composers, among them Stravinsky, Berg, Messiaen, Lutosławski, Takemitsu, Berio and Grisey, have succeeded in anchoring certain non-diatonic sets of pitch-classes to roots in very satisfying ways. I have simply sought to develop some of these devices further. And I am hardly alone among contemporary composers in owing considerable debts to most of these figures, in

⁶⁰ Dahlhaus, Carl: *Studies on the Origin of Harmonic Tonality*, transl. Robert O. Gjerdingen, Princeton: Princeton University Press ([1966] 1990), pp.3-4.

⁶¹ Reti, Rudolph: op.cit. (1958), p.67. See this paper, p.10. In practice, the matter hinges on whether one accepts Reti's idiosyncratic use of the label 'tonic'. See this paper, p.11, footnote 53. See also Chapter 12.

⁶² Ibid., p.68. See this paper, p.10.

⁶³ Ibid., p.68. See this paper, p.10.

⁶⁴ This term will be defined in Chapter 3. It has been employed by other commentators – see Chapter 3.

terms of harmonic technique – far from it.⁶⁵ But each of us seeks our own path. To my ears and knowledge, no composer has taken these techniques in quite the direction that I have been exploring.

Before we can examine my harmonic methods in detail, we must cover further conceptual ground. Chapter 2 explores the question of comprehensibility – above all harmonic – in ostensibly ‘atonal’, ‘non-tonal’ and ‘post-tonal’ music, challenging some common assumptions. Chapter 3 begins by establishing certain essential terminological distinctions concerning consonance and other related phenomena. Those are essential not only to the ensuing discussion of euphony in sensorily dissonant harmony later in the same chapter, but to the rest of the paper. Chapter 4 demonstrates a simple, transparent alternative to Allen Forte’s so-called ‘pitch-class set’⁶⁶ taxonomy, similar to a considerably lesser-known system devised by Ernst Bacon.⁶⁷ This is intended to provide a far sharper focus to the ensuing analytical discussion than would otherwise have been possible.

Having passed that point, the reader will at last be equipped to explore my harmonic methods in earnest.

⁶⁵ Grisey, though a wonderful composer, and immensely influential on others, has not so far exerted any substantial influence on my approach.

⁶⁶ See this paper, p.1, footnote 5.

⁶⁷ Bacon, Ernst Lecher: ‘Our Musical Idiom’ in *The Monist*, vol.27 issue 4 (October 1917), pp.592-603.

2. Coherence in Ostensibly ‘Atonal’, ‘Non-Tonal’ or ‘Post-Tonal’ Music

‘Serialism is dead!’⁶⁸

‘All revolutions need an enemy, and for spectral musicians the target was clear: serialism.’⁶⁹

Over the last 50 years or so, a great deal has been written concerning coherence in ostensibly ‘atonal’ music. Publications by Fred Lerdahl ([1988] 1992)⁷⁰ and Leonard Meyer ([1967] 1994)⁷¹ have counted among the more influential. Both authors, along with countless others, aim their criticism at the easiest of targets: serialism.

Lerdahl ([1988] 1992) focuses on a single serial composition – Boulez’s *Le Marteau sans Maître* (1955)⁷² – which he considers ‘representative’.⁷³ He does not acknowledge that many serial works are in fact aesthetically, technically and conceptually worlds away from *Le Marteau*, including Boulez’s own aforementioned *Dérive 1* (1984), in which the harmony, above all, is far more aurally comprehensible. Further, in asserting that he ‘could have illustrated [the same points] just as well’⁷⁴ through examining works by any of five other composers, Lerdahl omits to mention that two of those listed – Elliott Carter and Iannis Xenakis – wrote largely non-serial music.

Since roughly the time of the first edition of Meyer’s book (1967), it has become fashionable *even among new music circles* to denounce serialism as the root cause of most, if not all ostensibly ‘atonal’ ills. Lerdahl’s diagnosis that ‘serial (or 12-tone)’⁷⁵ organizations are cognitively opaque⁷⁶ has

⁶⁸ Reich, Steve, quoted in Lebrecht, Norman: ‘A Subtext for Deepening Confusions: Steve Reich at 70’ in *La Scena Musicale*, 9 August 2006 [online]. <<http://www.scena.org/columns/lebrecht/060809-NL-Reich.html>>.

⁶⁹ Fineberg, Joshua: *Classical Music, Why Bother?*, London and New York: Routledge (2006), p.132.

⁷⁰ Lerdahl, Fred: ‘Cognitive Constraints on Compositional Systems’ [1988] in *Contemporary Music Review*, vol.6, n°2 (1992), pp.97-121.

⁷¹ Meyer, Leonard: *Music, the Arts, and Ideas*, Chicago: The University of Chicago Press, ([1967] 1994).

⁷² Boulez, Pierre: *Le Marteau sans Maître* [1955], online audio (20.1.2015) : <https://www.youtube.com/watch?v=MS82nF85_gA>.

⁷³ Lerdahl, Fred: op.cit. ([1988] 1992), p.97.

⁷⁴ Ibid., p.100.

⁷⁵ Note the conflation: serial music need not be dodecaphonic.

⁷⁶ Lerdahl, Fred: op.cit. ([1988] 1992), p.97.

become quite common currency. There is evidently a distinction between ‘serial organizations’ and serial music. But at first glance, nevertheless, the assertion would seem somewhat plausible, and would seem to extend to the music itself: the treatment of pitch in *Le Marteau* is patently unintelligible, and the same holds true of the majority of serial music.

Both Lerdahl and Meyer maintain that the principal cause of the incoherence of such music is its complexity. Meyer also considers secondary factors, such as the general public’s lack of familiarity with serialism – as true today as 50 years ago – exacerbated by the lack of a single serial style. But Meyer’s main concern is as follows:

‘Because its level of redundancy is extremely low, total serial music presents the listener with so much novel, densely packed material that even those parts of the musical message which might have been intelligible are often masked and confused by the welter of incoming information. The listener’s channel capacity – his perceptual, cognitive neural network – is so overloaded that it is unable to process the musical message.’⁷⁷

Despite the title of the chapter in which this argument is put forth – ‘Perception and Cognition of Complex Music’ – there is very little mention of any other kind of ‘complex music’ besides serialism:⁷⁸ the two are treated almost as synonymous. Richard Taruskin ([1989] 2008), in echoing Meyer and Lerdahl, both identifies and endorses a growing readiness among composers and academics to cast serialism as a communal scapegoat, denouncing its ‘structural complexities’:

‘The unlimited technical advances and structural complexities in which composers reveled during the Second Zig [defined as the post-war period, dominated by the ‘maximalism’⁷⁹ of the ‘total serialists’⁸⁰] have been cried down as deluded in the light of modern cognitive psychology and structural linguistics. There do seem to be limits on perceptual comprehension... [Taruskin cites Lerdahl ([1988] 1992).] Meanwhile, the fact that unregenerate ziggers have been outspokenly unwilling to accept such constraints has led to their discreditation not only by the civilian population but also to a large extent within the profession.’⁸¹

⁷⁷ Meyer, Leonard: *Music, the Arts, and Ideas*. Chicago: The University of Chicago Press ([1967] 1994)., p.291.

⁷⁸ Further: ostensibly, at the outset, Meyer’s focus is on ‘total serialism’ and not ‘serialism’ (ibid., p.266). But the author subsequently blurs the distinction, at times even using both terms interchangeably (e.g. p.276, which contains examples in every paragraph).

⁷⁹ Taruskin, Richard: ‘*Et in Arcadia Ego*; or, I Didn’t Know I Was Such a Pessimist until I Wrote This Thing’ [1989] in *The Danger of Music*, Berkeley and Los Angeles: University of California Press (2008), p.8. Taruskin identifies Boulez and Milton Babbitt (p.8). His inclusion of Cage among such ‘technocrats’ (p.8) is puzzling: Cage was surely the very opposite of a ‘technocrat’. In effect, Taruskin’s focus remains largely on total serialism.

⁸⁰ Ibid., p.9.

⁸¹ Ibid., p.10.

Later in this paper, where pertinent, we shall encounter similarly damning statements from Taruskin again (Chapters 8 and 9), Richard Meale (Chapter 9), Tōru Takemitsu (Chapter 12) and Peter Burt (Chapter 12). One might easily, if gratuitously, cite dozens more.

George Benjamin (1997), whilst also strongly critical of serialism, has articulated a somewhat different view. Whilst I do not fully concur, I contend that in three short sentences, Benjamin has come closer to diagnosing the precise cause of the problems that have hitherto afflicted much serial music than have Lerdaahl, Meyer, Taruskin, Reich (2006), Fineberg (2006) – all quoted above –, Meale, Takemitsu, Burt or a host of others:

‘The problem with serial music is first and foremost the lack of poetry,⁸² of meaning, of harmonic control. But there is also a loss of speed and energy, everything that comes from mastery of harmony. These are terrible losses.’⁸³

I believe Benjamin to be correct in assessing that ‘lack of... harmonic control’ constitutes the primary source of incoherence in so much serial music. I maintain that the root cause of the problem is not the complexity itself, but a lack of *harmonic clarity* which frustrates any attempt to present such complexity in any readily intelligible way. Where my view departs from Benjamin’s is that I hold that the ‘lack of... harmonic control’ existed prior to the adoption of serialism. I consider that serial mechanisms simply exacerbate *existing* deficiencies in a composer’s harmonic technique. Serialism shows up such shortcomings in an especially brutal way, whereas certain forms of atonally- or near-atonally-conceived music would seem almost purposely designed to mask them.⁸⁴ I contend that in the rare instances where a composer’s harmonic command of the 4,096 is total, serialism becomes not only viable but immensely rewarding. This angle will be explored considerably further in Chapters 7-9.

⁸² And yet in 2015, Benjamin paid the following tribute to the unwaveringly serial Boulez: ‘He was simply a poet.’ See Benjamin, George, in conversation with Imogen Tilden: ‘George Benjamin on Pierre Boulez: “He was simply a poet”’ in *The Guardian*, 20.3.2015 [online]. <<https://www.theguardian.com/music/2015/mar/20/george-benjamin-in-praise-of-pierre-boulez-at-90>>.

⁸³ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: *George Benjamin*, transl. Julian Anderson and Michael Durnin, London: Faber and Faber (1997), p.15.

⁸⁴ See this paper, pp.3-4.

The obvious consequence of erroneously diagnosing complexity as the source of incoherence has been a reaction against complexity. Above all, within the ostensibly ‘atonal’ domain,⁸⁵ since the 1970s, many composers have followed Meyer’s injunction to simplify, and slow things down:

‘The existence of a shared and relatively stable musical style constitutes a kind of *cultural* redundancy. When such redundancy is low (as in the case of recent serial music, where each new work involves a somewhat different syntax), *compositional* redundancy must be proportionally higher if the organization is to be perceived and learning is to take place. Looked at in another way, the less familiar we are with the grammar and syntax of a style, with the ways in which musical events are related to and imply one another, the slower must be the rate at which the events are presented if they are to be intelligible.’⁸⁶

This is unsound logic. If the ‘grammar and syntax’ are clearly and competently handled, listeners will quickly find their cognitive bearings, even with an unfamiliar style – provided that they are also seduced by the euphony of the sounds themselves (see Chapter 3). Fast rates of change are then possible. That is, in Meyer’s terms, if ‘learning is to take place’ – in any setting – one should above all *clarify* and *engage*. Granted, in certain circumstances, a slower pace can also be useful, or even necessary. But if one resorts to such a strategy too often, the level of interest will eventually drop, and with it, the possibility of any ‘learning’ grinds to a halt. One must instead raise the bar: find a way to embrace complexity and a fast pace, where desirable. The concert hall and the classroom are no different in that respect.

Again, whilst I do not altogether agree, Benjamin throws a clearer light on the matter than most. That is, the third paragraph quoted below begins to acknowledge the many expressive limitations that arise, if one’s approach to the harmonic problem simply involves slowing everything down:

‘The stranger and more complex a sonority or harmony becomes, the longer the ear needs to hear it properly. That’s why Gérard Grisey and Tristan Murail use such a broad harmonic rhythm, where the music goes from one chord to another very slowly.’⁸⁷

⁸⁵ Diatonic minimalism, likewise a reaction against complexity, need not concern us here. Of course, in the cases of Steve Reich and certain others, minimalism is also specifically a reaction against serialism. See the opening quotation of this chapter, p.15.

⁸⁶ Meyer, Leonard: op.cit. ([1967] 1994), p.282.

⁸⁷ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: *George Benjamin*, transl. Julian Anderson and Michael Durnin, London: Faber and Faber (1997), p.21.

‘Certain composers have tried to hold on to the post-serial rules (no octaves, no tonality...) and to replace harmonic chaos with harmonic stasis. This kind of stasis is fashionable today. But the chords used are very complex acoustically and they are always novel. So they have to evolve slowly...

‘But if you want spontaneous, complex melodic phrases full of vitality, how do you assimilate them into such a rigid set-up? On the other hand, if you have lively and extremely varied melodies in a very rich counterpoint, how do you control the harmony?’⁸⁸

I maintain that the ear needs longer to hear *opaque* harmonies. Whilst, in certain instances, some allowance should also be given for the ear to hear certain *complex* sonorities, I hold that the time required is incalculably shorter than is commonly believed among composers today – *provided that the roots of such sonorities are controlled and clarified through certain techniques of spacing and voice-leading*. If one’s harmonic technique is up to the task, under the right conditions, certain complex sonorities can, in fact, be presented in very quick succession. If the spacing illuminates such sonorities correctly, the ear will catch enough of them. The sheer exhilaration generated by rapid harmonic progressions of this kind is then immensely rewarding. That so few ostensibly ‘atonal’ composers can successfully handle fast rates of harmonic change is, I hold, a consequence of deficiencies in harmonic technique among the others – leading many to conflate opacity with complexity.

In response to the second of Benjamin’s questions quoted above, I propose that the most efficient way of controlling the harmony is to control chordal roots, *Klangverwandtschaften*⁸⁹ and euphony in sensorily dissonant sonorities – the focus of Chapters 3 and 5.

⁸⁸ Ibid., p.15-16.

⁸⁹ This term, borrowed from Hermann von Helmholtz ([1863] 1913), will be explained very shortly in the following chapter.

3. Euphony in Sensorily Dissonant Harmony

‘L’harmonie est proprement une suite d’accords qui en se succédant flattent l’organe.’
[‘Harmony is properly a series of chords that, by their succession, please the ear.’]⁹⁰

To ‘please the ear’ was once, perhaps, the aim of all harmony. However, to many listeners, most ostensibly ‘atonal’ harmonic material might not appear intrinsically very conducive to that purpose. That is, of the 352 possible *interval-class sets*,⁹¹ 344 are *sensory* dissonances (see below). But in fact, the inherent sensory dissonance of any given *set of pitch-classes* is no barrier to euphony, where desirable, if the spacing and register are intelligently handled. Thus, harmony embracing the 4,096 can be made to consistently ‘please the ear’, if that is one’s expressive intention.⁹³ Technically and aesthetically, that is a cornerstone of my approach. But before we can demonstrate the phenomenon, it is necessary to clarify several inter-related definitions: *sensory* consonance or dissonance, *Klangverwandtschaft*, and *contextual* consonance or dissonance.



A. **Sensory consonance or dissonance.** According to Reiner Plomp and Wilhelm Levelt,⁹⁴ a ‘*tonally* dissonant’ interval [my italics] produces audible beats between the partials of the two pitches. These beats occur when the difference between the two frequencies falls within a critical

⁹⁰ D’Alembert, Jean le Rond: *Éléments de musique théorique et pratique suivant les principes de M. Rameau, éclaircis, développés et simplifiés*, Lyon: Jean-Marie Bruyset ([1752] 1766), pp.1-2. This sentence only: transl. Robert O. Gjerdingen, quoted in Dahlhaus, Carl: op.cit. ([1966] 1990), p.22.

⁹¹ Throughout this paper, the term ‘*interval-class set*’ will be used to denote what Allen Forte (1973)⁹² and others have misleadingly labelled ‘pitch-class sets’ – see this paper, p.1, footnote 5. For the purposes of our discussion, inversionally-related *interval-class sets* are treated as distinct, since their *Klangverwandtschaften* (see this paper, p.21) – and therefore grammatical implications (some might prefer ‘tonal implications’) – are distinct. In less technical terms: whilst Forte’s system does not distinguish, for example, between the major and minor triads, these are neither expressively nor grammatically identical. For our purposes, there are therefore 352 such *interval-class sets*, and not 224.

⁹² Forte, Allen: *The Structure of Atonal Music*, New Haven and London: Yale University Press (1973), pp.1-3.

⁹³ Evidently, *deliberately* non-euphonious music is also valid. Euphony and quality are not synonymous.

⁹⁴ Plomp, Reiner and Levelt, Wilhelm: ‘Tonal Consonance and Critical Bandwidth’ in *Journal of the Acoustical Society of America* 38 (1965), pp.548-560.

bandwidth. Within equal temperament, the most ‘*tonally* dissonant’ interval-class is ‘the minor second, followed by the major second and tritone.’⁹⁵

Plomp and Levelt use the term ‘tonal’ to denote ‘*between tones*’, but some might perhaps infer a link with diatonic *tonality*. This is problematic: firstly, the phenomenon patently does not cease to be audible in non-diatonic music; secondly, the separate phenomenon of *contextual* dissonance also pertains to diatonic tonality (see section C below). Thus, the term ‘*tonal* dissonance’ creates unnecessary ambiguity. Ernst Terhardt (1984),⁹⁶ Fabien Lévy (2013),⁹⁷ Lerdahl ([1988] 1992)⁹⁸ and other commentators have opted for a more transparent formulation: ‘*sensory* dissonance’. That is also my preferred term.

B. ***Klangverwandtschaft***. Hermann von Helmholtz ([1863] 1913) establishes a distinction between what he labels ‘Konsonanz’ – essentially *sensory* consonance – and ‘*Klangverwandtschaft*’, or ‘affinity of sounds’. Helmholtz conceives the latter as tied to the harmonic series,⁹⁹ rather than to the avoidance of sensory roughness. That is, one or more tones are heard as partials of another tone. Terhardt (1984), acknowledging Helmholtz, upholds a similar distinction between:

‘sensory consonance (representing the more or less complete absence of annoying factors, that is, an aspect which is not specific to music but applies to any audible sound); and harmony (representing the music-specific principles of tonal affinity, compatibility, and fundamental-note relation)... This two-component concept has already been established by Helmholtz, although he... used a different terminology: *Konsonanz* (sensory consonance), and *Klangverwandtschaft* (harmony).’¹⁰⁰

Evidently, Terhardt’s definition of ‘harmony’ would give rise to terminological confusion within almost any wider or more detailed discussion of harmonic technique. *Klangverwandtschaft* also

⁹⁵ As summarised by Parncutt, Richard: ‘Tonal Implications of Harmonic and Melodic T_n-Types’ in *Mathematics and Computing in Music*, ed. Timour Klouche and T.Noll, Berlin: Springer (2009), p.135.

⁹⁶ Terhardt, Ernst: ‘The Concept of Musical Consonance: A Link between Music and Psychoacoustics’ in *Music Perception: An Interdisciplinary Journal*, vol.1, n°3, dedicated to Hermann von Helmholtz (Spring, 1984), p.276.

⁹⁷ Lévy, Fabien: *Le Compositeur, Son Oreille et ses Machines à Écrire: Déconstruire les Grammatologies du Musical pour Mieux les Composer*, Paris: Vrin (2013), pp.178-179.

⁹⁸ Lerdahl, Fred: op.cit. ([1988] 1992), pp.109-110.

⁹⁹ Helmholtz, Hermann von: *Die Lehre von der Tonempfindungen als physiologische Grundlage für die Theorie der Musik*, Braunschweig: Friedrich Vieweg & Sohn, ([1863] 1913), pp.419-425.

¹⁰⁰ Terhardt, Ernst: op.cit. (1984), p.293.

poses problems, in that Hugo Riemann ([1882] 1896)¹⁰¹ subsequently employed the same term in a distinct, narrower sense, not wholly incompatible with Helmholtz, but too inflexible to serve usefully outside the bounds of diatonic tonality. For the purposes of this paper, I am thus employing the term *Klangverwandtschaft* in a similar sense to Helmholtz, and not to Riemann. Specifically: I am referring to relationships between partials, considered independently of sensory consonance.

There is also a connection with French spectralism. Lévy (2013) draws a broadly comparable distinction between ‘la dissonance sensorielle’¹⁰² and what he terms ‘la dissonance spectrale’,¹⁰³ asserting that ‘a chord is [*spectrally*] consonant if it fits into a harmonic spectrum.’¹⁰⁴ However, the term ‘spectral consonance’ evokes certain conceptual, stylistic and technical connotations that I prefer to avoid. My own compositional approach to harmonic structure and grammar is in some respects diametrically opposed to the ‘spectral approach’,¹⁰⁵ as defined by Fineberg (2006), for example. Hence my preference for *Klangverwandtschaft*.

Octaves aside, clearly the closest intervallic *affinity*¹⁰⁶ occurs via the 3rd partial – the perfect 5th. Rameau ([1722] 2014) declares: ‘The fifth... is the origin of all chords.’¹⁰⁷ Helmholtz ([1863] 1913), likewise, quickly establishes the primacy of the fifth among intervals.¹⁰⁸ Through the centuries, legions of harmonic theorists have come to essentially the same conclusion, albeit via different routes. From this, I submit that the circle of 5^{ths} is also an important consideration in *Klangverwandtschaft*, as I conceive it.

¹⁰¹ Riemann, Hugo: ‘Tone Relationship’ [*Tonverwandtschaft*] in *Dictionary of Music [Musiklexikon]*, transl. John Shedlock, London: Augener ([1882] 1896), p.801. *Klangverwandtschaft* is translated as ‘clang relationship’. The entry on ‘clang-relationship’ (ibid., p.145) indirectly refers the reader to ‘tone relationship’, where ‘clang relationship’ (no hyphen this time) is also defined. See also the entry on *Klang*, translated as ‘clang’ (ibid., pp.143-145), dealing with the overtone series and a fictitious ‘undertone series’, contrived to justify the presence of the minor 3rd in the minor triad. See also footnotes 109-112 on the following page of this paper, regarding the imaginary ‘undertone series’.

¹⁰² Lévy, Fabien: op.cit. (2013), p.178

¹⁰³ Ibid., p.186.

¹⁰⁴ Ibid., p.187. My translation. The original reads: ‘un accord est consonant s’il s’insère à l’intérieur d’un spectre harmonique.’

¹⁰⁵ Fineberg, Joshua: op.cit. (2006), p.109. See also this paper, pp.5-6.

¹⁰⁶ That is, ‘affinity of sounds’. I shall henceforth use ‘*affinity*’ interchangeably with *Klangverwandtschaft*.

¹⁰⁷ Rameau, Jean-Philippe: *Treatise on Harmony*, transl. Philip Gossett, New York: Dover, ([1722] 2014), p.48. Similar statements appear on pp.15, 36, 38, 40, 42 and elsewhere.

¹⁰⁸ Helmholtz, Hermann von: op.cit. ([1863] 1913), pp.420-421.

After the 5th, the major 3rd (5th partial) possesses the next strongest *affinity*. Evidently, both interval-classes are also *sensory* consonances: so far, the distinction between *sensory* dissonance and *Klangverwandtschaft* might seem superfluous.¹⁰⁹ But after this point, audibly, certain *sensorily* dissonant intervals possess similarly strong, if not stronger intrinsic *affinity* than *sensorily* consonant ones. For example:

1. Taking a *sensorily* dissonant C and D:

- a. C might perhaps be heard as the 7th partial of D;
- b. D might perhaps be heard as the 9th partial of C;
- c. In the circle of 5^{ths}, C and D are 2 steps apart. (D is the 3rd partial of the 3rd partial of C.)

2. Taking a *sensorily* consonant C and Eb:

- a. Eb is the rather distant 19th partial of C, but cannot ordinarily be heard as such;
- b. In the circle of 5^{ths}, Eb and C are 3 steps apart.
- c. C and Eb could be heard as the 5th and 6th partials of an Ab – but only if the Ab were also to sound in fairly close proximity, or else be wilfully imagined by the listener.

There are other ways of hearing and rationalising both intervals, but none that could support a claim that the major 2nd possesses less intrinsic *affinity* than the minor 3rd.¹¹⁰ Therefore, *sensory* consonance and *Klangverwandtschaft* seem to be separate phenomena. The distinction corresponds closely to how I hear intervallic relationships, and is indispensable to my approach to harmony.

¹⁰⁹ Indeed, since Riemann's conception of *Tonverwandtschaft* ['affinity of tones', translated by Shedlock (1896) as 'tone relationship'] only extends to the first 6 partials of either the overtone series or the fictitious 'undertone series', in contrast to Helmholtz, he erroneously declares *Tonverwandtschaft* synonymous with sensory consonance – Riemann, Hugo: op.cit. ([1882] 1896), p.801. His conception of *Klangverwandtschaft* (translated as 'clang relationship'), however, encompasses relationships between tones which, if sounded together, would produce sensory dissonances – ibid., p.801.

¹¹⁰ That Riemann (see this paper, p.22, footnote 98), D'Indy ([1898] 1912)¹¹¹ and other theorists resorted to a fabricated, now wholly discredited¹¹² 'undertone series' is symptomatic. I advance that the minor triad's prominent role in diatonic harmony derives rather more prosaically from a) the 5th, and b) the avoidance of *sensory* dissonance. Other than the major triad and the open 5th, no other interval-class set satisfies both conditions.

¹¹¹ D'Indy, Vincent: *Cours de Composition Musicale, Premier Livre*, Paris: Durand ([1898] 1912), pp.98-103.

¹¹² See Rehding, Alexander: *Hugo Riemann and the Birth of Modern Musical Thought*, Cambridge: Cambridge University Press (2003), pp.15-35.

C. **Contextual consonance or dissonance.** Within the context of a specific piece, composed using a clearly-established system of harmonic grammar, such as diatonic tonality, a *contextual* dissonance is any sonority requiring resolution; a *contextual* consonance is the sonority to which it resolves. Fétis¹¹³ describes this as '*tendance*' (tendency, inclination) and '*repos*' (rest).

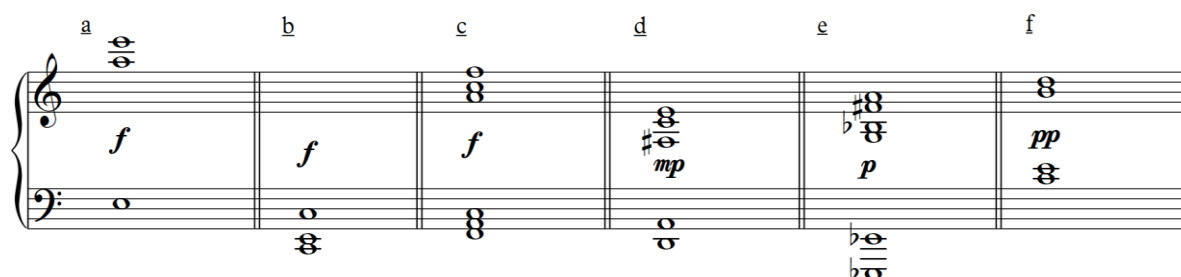
But a *tendance* need not be a *sensory* dissonance, and a *repos* need not be a *sensory* consonance. In a diatonic context, evidently, Chord II in any given key, even when presented as a sensory consonance, can only function as a *tendance*.¹¹⁴ Conversely, in a jazz idiom, in numerous instances where the final sonority of a piece happens to be a polychord, the inevitable element of sensory dissonance¹¹⁵ patently does not impede its structural function as a *repos*.



On an elementary level, Norman Cazden (1980) establishes that, within diatonic music, sensory consonance and euphony are not one and the same:

'It is generally granted that the special quality understood as [sensorily] consonant agreement should not be mistaken for agreeableness or agreeable effect, in the sense of pleasing or beautiful harmoniousness. It has often been pointed out that combinations that are normally classed as [sensorily] consonant, let us say in Fig. 2a, 2b and 2c, may in fact sound far from pleasant or appealing by themselves. And contrariwise, many combinations usually classed as [sensorily] dissonant, such as those in Fig. 2d, 2e and 2f, in the opinion of many, may indeed afford a lovely sonorous ring.'¹¹⁶

Fig. 2



¹¹³ Fétis, François-Joseph: *Traité Complet de la Théorie et de la Pratique de l'Harmonie*, Paris: Schlesinger (1844), p.iii, quoted in Dahlhaus, Carl : op.cit. ([1966] 1990), pp.8-9.

¹¹⁴ See Dahlhaus, Carl: op.cit. ([1966] 1990), pp.31, 54-57 and 64 – mostly summarising Riemann (various).

¹¹⁵ The only *sensorily* consonant interval-class sets larger than dyads are the major and minor triads, and the augmented triad. Therefore, all polychords contain sensory dissonance – augmented triads notwithstanding, were one to classify these as polychords on the basis that *a priori*, each of the three pitch-classes of a given augmented triad is equally plausible as a root.

¹¹⁶ Cazden, Norman: 'The Definition of Consonance and Dissonance' in *International Review of the Aesthetics and Sociology of Music*, Vol.11 n°2 (Dec. 1980), p.126.

Within a diatonic context, such a ‘lovely sonorous ring’ is very easy to accomplish, in technical terms. Furthermore, on a grammatical level, within diatonic tonality, even with relatively harsh spacings of a given chord, its implications tend to remain straightforwardly comprehensible. That is: taken in isolation, as a *set of pitch-classes*, any chord within the diatonic system possesses a clearly-defined range of potential implications. Any able diatonic composer handles that range of implications coherently and, where desirable, elegantly, as a matter of course.

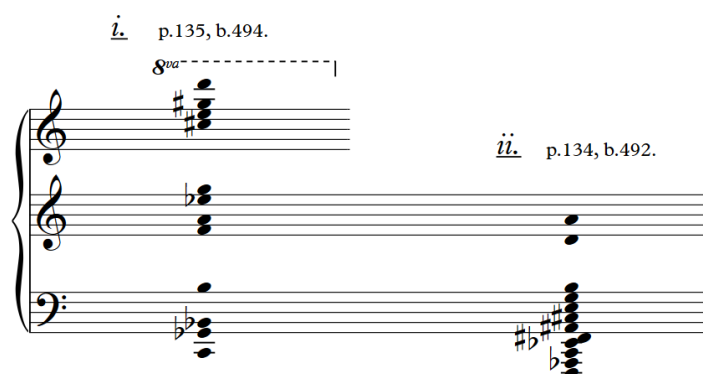
The same is emphatically not true of ostensibly ‘atonal’ music. The 4,096 pose a far greater challenge to a composer’s harmonic technique, for two main reasons. The first of these is the preponderance of sensory dissonances – 344/352, as previously mentioned. Secondly, outside the diatonic domain, in most cases, the inherent *affinities* between constituent pitch-classes of a given set are conflicting or ambiguous. That is: typically, in such instances, within the set of pitch-classes, several rival *affinities* compete for the listener’s attention, with no obvious in-built hierarchy. Consequently, when a chord or sonority is constructed from such a *set of pitch-classes*, the grammatical purpose – if there is one – can prove impossible for the listener to grasp. Thus, considered as a harmonic unit, any given ostensibly ‘atonal’ *set of pitch-classes* runs a substantial risk of appearing a) ugly, and/or b) aurally incomprehensible. Naturally, neither a) nor b) is necessarily aesthetically unjustifiable, depending on the composer’s expressive intentions. But a pitch-class vocabulary that were to *stipulate* both ugliness and harmonic incomprehensibility would amount to a considerable expressive handicap.

Fortunately, that is not the case with the 4,096. But from a great many ostensibly ‘atonal’ scores written between 1908 and the present day, one could perhaps be forgiven for thinking otherwise. The following 17 isolated chords, of which 13 are non-diatonic, will serve as illustrations. All were selected from works which, in aesthetic terms, embrace harmonic ugliness and opacity, with fascinatingly uncompromising results. The composers are Elliott Carter, Karlheinz Stockhausen, Kaija Saariaho, Wolfgang Rihm and Harrison Birtwistle. Evidently, since my harmony encompasses the full

4,096, all 17 chords are built from *sets of pitch-classes* of a kind that I habitually employ. But the 13 non-diatonic chords, above all, are the result of very different approaches to spacing to mine. Their spacings reflect very different aesthetic, grammatical and structural concerns. Although, on a pitch-class level, we deal with very similar vocabulary, these composers hear harmony fundamentally differently to me. The effects on the listener are worlds away.

We begin with two chords from Carter's *Piano Concerto* (1965), both of which contain all 12 pitch-classes:

Carter, Elliott: *Piano Concerto* [1965]
New York and London: Associated Music Publishers - AMP 6735 (1991).



In chord *i*, the numerous inherent sensory dissonances within the full chromatic set are appreciably mitigated through spacing. There is only one strong sensory dissonance¹¹⁷ between adjacent pitches – the minor 9th between the B and Bb in the bass clef. Furthermore, taken in isolation, the spacing in certain parts of the chord brings into focus certain *affinities* (or *Klang-verwandtschaften*) between pitches. The four pitches of the middle staff evidently sound as an F major 9th. If these pitches are played together with the C# minor triad above, the resultant chord is both attractive to the ear and aurally comprehensible as a polychord. But to my ears, the high D, and – above all – the lowest three notes in the bass register emphatically undermine this aspect of the chord. Concerning the lower register, Benjamin (1997) asserts:

¹¹⁷ By this, I mean that the *interval-class* between the pitches in question is a semitone – i.e. the *interval* is a semitone, a major 7th, a minor 9th, etc. In this, I am following the findings of Plomp and Levelt (op.cit., 1965). See this paper, pp.20-21. The matter will be clarified further in Chapter 4.

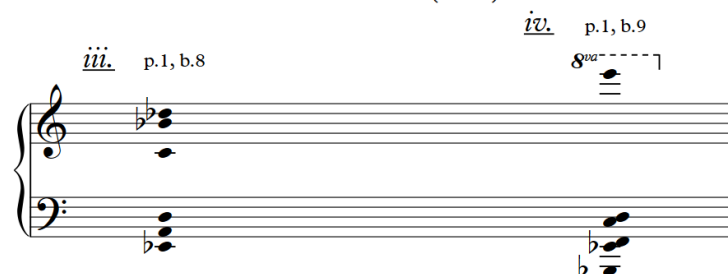
'If you don't have octaves... and want to write a dark passage in the bass, you pick three notes below the viola's C and you get a sonic confusion which the ear finds extremely difficult to discern. If you want this confusion, a kind of acoustic chaos, that's fine – it's fantastic for thunder! (I exploited it throughout my first orchestral piece, *Ringed by the Flat Horizon*.) However, if you want a 'comprehensible' clarity, the use of a higher register (and octave doublings) will be needed.'¹¹⁸

In this case, the 'sonic confusion' generated by the three lowest pitches is compounded by the intervals between those pitches – all three lie within a small range; the diminished 5th at the bottom of the chord muddies the harmonic water considerably; the minor 9th higher up creates further ambiguity. Consequently, taken as a separate entity, the chord is neither euphonious nor, in grammatical terms, readily comprehensible to the listener.¹¹⁹

Chord *ii*, likewise, loses a great deal of potential clarity and euphony, through an extremely densely-packed lower register. Were one to remove the high A, and transpose the remaining 11 pitches up two octaves, the result would be a considerably prettier and more aurally intelligible triadic polychord. Pretty, since in this case, Carter has avoided sensory dissonances between adjacent pitches altogether. Aurally intelligible, since the stacks of thirds generate obvious *Klangverwandtschaften*. Thus, the ugliness and opacity of chord *ii* are purely down to register.

The following two six-note chords from Stockhausen's *Kreuzspiel* (1951) share several traits with the Carter chords. Here again, both *sets of pitch-classes* possess high levels of sensory dissonance. Here again, between adjacent pitches, strong dissonances are consistently avoided:

Stockhausen, Karlheinz: *Kreuzspiel* [1951]
London: Universal Edition - UE 13117 (1960).



¹¹⁸ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: *George Benjamin*, transl. Julian Anderson and Michael Durnin, London: Faber and Faber (1997), p.18.

¹¹⁹ Such assertions are not intended as value judgements. I am not suggesting that any of the features described here were anything but deliberate on Carter's part. However, the focus of this discussion is not on Carter's aesthetic objectives, but on how spacing and register affect the structural and expressive potential of a given sonority, as it stands, irrespective of context – with a view to explaining my own approach.

Again, therefore, some very simple registral adjustments would induce considerably greater aural beauty and harmonic clarity. In chord *iii*, moving the top three pitches up one octave and the bottom three up two octaves would tidy up matters on both fronts. The lowest five pitches of chord *iv* would likewise transform into an attractive, instantly comprehensible Eb minor sonority, if transposed two octaves higher.¹²⁰

In each of the following four chords from Saariaho's *Verblendungen* (1984), yet again, the configuration of the bass register impedes potentially greater euphony and grammatical clarity:

Saariaho, Kaija: *Verblendungen* [1984]
Helsinki: Edition Wilhelm Hansen - KP 00106 (1984).

The image shows a musical score for four chords from Saariaho's *Verblendungen*. The chords are labeled *v*, *vi*, *vii*, and *viii*. Above each chord, the page number and measure number are given: *v* p.1, b.1; *vi* p.2, b.14; *vii* p.3, b.22; *viii* p.15, b.83. The chords are written for piano (p.) and bass (b.). The chords are complex, with many overlapping notes, and the bass register is particularly dense and dissonant.

In chord *v*, although the low 5th provides some anchoring, the small intervals in the bass clef muddy the harmonic water considerably. In *vi* and *vii*, although the distances between the lowest pitches are now larger, the major and minor 7^{ths} and minor 9th not only generate sensory dissonance but preclude *Klangverwandtschaft*. Thus, euphony is consistently avoided, and – taken in isolation – the grammatical implications of these chords are unclear to the listener. In *viii*, the highest seven pitches, taken separately, would sound relatively intelligible – indeed beautiful. However, rather like the 12-note Carter chord discussed earlier (*i*), those potential attributes are thoroughly obscured by the ambiguity and instability of the three lowest pitches – in this case, an augmented triad.

Self-evidently, chords *ix-xii* from Rihm's *IN-SCHRIFT* (1995), given below, each constitute extreme examples of both sensory dissonance and grammatical opacity:

¹²⁰ One of the central concerns of *Kreuzspiel* is the movement of various pitches from one register to another: that is part of the point of the piece. However, the focus of this discussion is not on Stockhausen's intentions.

Rihm: *IN-SCHRIFT* [1995]
Vienna: Universal Edition - UE 34299 (1995).

Taken strictly in isolation, such chords perhaps amount to a rare, genuine ‘denial of harmony as a structural means’¹²¹ – or at the very least, a near-denial. A striking feature of *IN-SCHRIFT* is that almost all chordal sonorities are constructed in this way. That said, other, far less abrasive and more intelligible harmonic elements are normally present elsewhere in the texture – therefore most of *IN-SCHRIFT* is *non-tonally*-, rather than *atonally*-conceived.

For the present purposes, the short *post-tonally*-conceived section – a progression of diatonic and pandiatonic chords from b.170 (p.39) onwards – is more revealing.¹²² Chords *xiii-xvi* are representative of the passage as a whole. They are almost as densely packed as *xi* and *xii*, and occupy a fairly similar registral spread to *ix-xii*. But in stark contrast to *ix-xii*, they achieve “comprehensible” clarity¹²³ in this register. The A minor *Klangverwandtschaft* of *xiii/xv* comes through unimpeded. The pandiatonic *xiv* and *xvi* each contain several sensory dissonances – indeed, in the latter, we find a strong sensory dissonance between two adjacent pitches (B and C). But in their A minor surroundings, *xiv* and *xvi*, too, remain harmonically intelligible. For the only time in the piece, we experience – *specifically through chordal sonorities rather than other textural elements* –

¹²¹ Cage, John: ‘Forerunners of Modern Music’ [1949] in *Silence: Lectures and Writings*, Middletown, Conn.: Wesleyan University Press (1961), p.63. See this paper, p.4, footnote 15.

¹²² Rihm, Wolfgang: *IN-SCHRIFT* [1995], online video (29.11.2013): <<https://www.youtube.com/watch?v=i62K43AI4ro>>, 9:48-10:01 and beyond.

¹²³ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: op.cit. (1997), p.18. See this paper, pp.26-27. Evidently, due to the presence of octaves in these chords, Benjamin’s assertion still holds.

harmonic clarity; perhaps even harmonic beauty of a kind. It is as though the art of coherent and euphonious chordal harmony itself had been rendered obsolete, and henceforth could only feature via a self-conscious diatonicism placed in quotation marks – a post-tonal, post-modern cliché.¹²⁴ Such juxtapositions are of course valid per se. But in purely chordal terms, as will be demonstrated over Chapters 5-8 of this paper, so much more is possible.

The following chord from Birtwistle's *The Triumph of Time* (1972) is constructed a little differently to those sonorities considered hitherto:

Birtwistle, Harrison: *The Triumph of Time* [1972]
London: Universal Edition - UE 15518 L (1974).

xvii. p.42, 5/8 bar, first chord.



The chord is deliberately ugly; in that respect, it resembles the first 12. In expressive terms, this sonority marks an extreme: its *interval-class* vector exhibits the very highest level of sensory dissonance among the 80 hexachordal *interval-class* sets. The latent *affinities* within the constituent *set of pitch-classes* are also relatively difficult to untangle. But taken in isolation, the spacing of this chord, to some extent, does just that. Firstly, the gravitational weights of each of the six pitch-classes are reinforced via octave doublings: there are twelve pitches, but only six pitch-classes. Secondly, although the major 7th between the two lowest voices muddies the *Klangverwandtschaft* somewhat, the bass register is not overloaded, in contrast to those of chords *i* to *xii*. It is even possible to hear two roots: a) an F# minor 9th in the lowest seven pitches, clearly anchored by the lowest note, with the F above it heard enharmonically as an E#; b) essentially an E minor sonority in the highest five pitches. That these roots are perceptible is in no small part due to the octave doublings.

¹²⁴ See this paper, pp.8-10.

In practice, in the context of the passage of similarly dense, sensorily dissonant, homophonic string chords in which chord xvii occurs, we do not hear it as an F# minor/E minor polychord.¹²⁵ Indeed, in that context, as harmony, its grammatical function remains opaque. Moreover, even as an isolated sonority, it is far from beautiful. The spacing is not of a kind that I would normally select: typically, in constructing a chord from an *interval*-class set such as this one, I look to clarify the *Klangverwandschaft* further still, and rein in the strong sensory dissonances a little more.¹²⁶ However, unlike the Carter, Saariaho and Rihm chords quoted earlier, the spacing of chord xvii would enable it take on a more elegant and comprehensible grammatical function, in the right context.¹²⁷

I submit that, compared to chords i-xii and xvii listed above, and in more general terms to the outputs of Carter, Stockhausen, Saariaho, Rihm and Birtwistle as a whole, my approach to spacing consistently allows for a substantially more euphonious harmonic discourse in which individual sonorities, taken in isolation, are also far more readily cognisable on a consistent basis. This statement signifies merely that I hold a very different position, regarding harmonic aesthetics and technique. It is in no way a criticism of these composers, all of whom I greatly admire, and who have influenced my work in other ways – especially Carter and Birtwistle. However, my rejection of their approaches to spacing is emphatic. I have simply chosen a very different creative path, when it comes to harmony. Moreover, the caveat ‘*taken in isolation*’ is crucial. For example, in practice, as is so often the case in spectral music, the extremely slow harmonic movement in Saariaho’s *Verblendungen* is surely intended to counteract the intrinsic opacity of the sonorities.¹²⁸

¹²⁵ Birtwistle, Harrison: *The Triumph of Time* [1972], online audio (15.7.2015): <https://www.youtube.com/watch?v=ebE7Tv9T6_A>. Chord xvii occurs at 19:47-19:49. The string chords extend from 19:26 to 22:36 and beyond.

¹²⁶ These points will be demonstrated later. The same *interval*-class set appears several times in *Madame de Meuron*, *The Art of Thinking Clearly* and elsewhere in my music. Indeed, the very same *set of pitch-classes* features in *Velvet Revolution*, p.10, b.65-66 (the arpeggiated hexachord), within a near-diatonic passage (pp.10-15, b.63-96). These bars correspond to 1:51-1:54 and 1:49-2:48 of the audio file, respectively.

¹²⁷ That is not to suggest that Birtwistle has provided the ‘wrong’ context. It is again a question of intentions.

¹²⁸ Saariaho, Kaija: *Verblendungen* [1984], online audio (13.8.2012): <https://www.youtube.com/watch?v=yVm7dTUcTNw>, 0:00-4:10 and beyond.

More importantly still, I must immediately qualify that, regarding both aesthetics and technique, the work of another group of extremely distinguished figures provides very significant precedents to my own harmonic ventures. At this stage, two isolated chords will suffice to demonstrate this. Chord xviii, below, is constructed in such a way as to induce both beauty and clarity. It does not appear in any composition that I am aware of, but is listed in Messiaen's *Technique of My Musical Language* ([1944] 1956):

Messiaen, Olivier: *Technique of My Musical Language, Vol.2: Musical Examples*, transl. John Satterfield, Paris: Alphonse Leduc ([1944] 1956).

xviii. p.37, No.206.

Considered purely as an *interval-class set*, xviii closely resembles some of the chords discussed earlier. In fact, were one to add an E to chord xviii, its *interval-class set* would then match that of chord v (Saariaho). And yet the effect is highly contrasting on two counts.

From a sensory perspective, the sting of the six semitones within the *interval-class set* is significantly alleviated. This is achieved firstly through spacing: there are no adjacent semitones between the pitches of the chord, with five pitches separating the G and G#, three pitches separating the C and B, and so on. Secondly, the choice of register helps to moderate the various sensory dissonances within the interval-class set further still – a crucial distinction between chord xviii and chords i-iv quoted above, which likewise avoid strong sensory dissonances between neighbouring pitches.

From a cognitive perspective, *Klangverwandtschaften* are clearly audible from a variety of angles. That is, pitches containing stronger *affinities* tend to be placed adjacently, bringing these *affinities* into sharper focus for the listener. Thus, the lowest five pitches can be heard as a B major 9th, and the ear can simultaneously pick out Db major and F minor sonorities higher up. The chord can also

be heard in other ways: the point is that *both* the spacing and the register illuminate this web of relationships, unlike the Carter, Stockhausen and Saariaho chords and the *non-diatonic* Rihm chords quoted above, all of which obfuscate these various relationships on either or both counts.

In isolation, chord xviii is compatible with my harmonic idiom, with two qualifications. Firstly, when considering possible spacings, I normally seek to avoid solutions that bear too obvious a resemblance to Messiaen's style. Secondly, on a chord-to-chord basis, I do not normally think in terms of single modes, as Messiaen frequently does, so the grammatical context in which I might employ a chord such as xviii would be very different. Nonetheless, Messiaen's approach to spacing has influenced me immensely. Of course, countless other composers, including illustrious and highly accomplished figures, have likewise tangibly benefited from Messiaen's harmonic influence.

One such composer was Tōru Takemitsu. Chord xix, from *Rain Spell* (1980), is similarly luminous and alluring:

Takemitsu, Toru: *Rain Spell* [1980]
Tokyo: Schott - SJ 1011 (1983).

xix. p.2, shortly after figure A.

8va⁻⁻⁻]

8va⁻⁻⁻]

C Mm⁷

C# Mm⁶

There are five semitone clashes within the chord's *interval*-class set. Here again, the effect of these strong sensory dissonances is substantially diminished by the spacing. Of the seven pitch-classes involved in these clashes, only the E and F are placed adjacently. In cognitive terms, the *Klangverwandtschaften* are clear: a C major/minor 7th in the high register, and a C# major/minor sonority in the lower half of the chord. Again – euphonious and readily comprehensible, considered separately, this chord would fit comfortably within my harmonic idiom. But I would seek to exploit

its grammatical implications in a very different way to Takemitsu: I am concerned with different types of harmonic momentum, process and structure.

In the chords presented so far, the element of opacity, where present, is almost invariably provided by the bass register. Neither the Messiaen nor Takemitsu chords listed here extend significantly below middle C, and each of my expedient suggestions for clarifying certain sonorities in Carter (*i*, *ii*), Stockhausen (*iii*, *iv*), and Saariaho (*viii*) simply involves avoiding the bass register. That is because, to attain both euphony and harmonic coherence across a range that includes the bass, chords *i-xii* and *xvii* would each need to be completely reconfigured. The techniques through which this could be achieved would be better illustrated directly, through examples from my own practice, to which we will turn in Chapter 5.

4. Classification of Chordal Sonorities

For the most part, the influential system of so-called ‘pitch-class set’ classification and analysis developed by Forte (1973)¹²⁹ and others is less than ideally suited to a lucid demonstration of my harmonic technique. I will therefore demonstrate a more transparent alternative, for our purposes.

I cannot claim the alternative as my own. I conceived it independently, totally unaware of a remarkable, little-known precedent – a taxonomy devised by Ernst Bacon in 1917, entitled ‘All Existing Harmonies of the Duodecimal System’.¹³⁰ Bacon was then a 19-year-old mathematics student. Upon turning to composition in his 20s, Bacon’s interest in this taxonomy waned; he did not find any meaningful use for it in the creative process. But Bacon’s classification system is very clear-sighted. Used sensitively, with some developments and adjustments, it has significant potential as a supplement to some forms of harmonic analysis.

We will arrive at the classification itself at the last of the four points listed and discussed below. A chord may be considered in any of the following terms:

1. As a set of pitches,
2. As a *set of pitch-classes*,
3. As a set of intervals between adjacent pitches,
4. As a set of interval-classes between adjacent pitch-classes.

There are other useful ways to define and classify chords, but in the present context, these four will suffice. To define a chord as (1.) a set of pitches, evidently, one simply notates it. As previously stated,¹³¹ for our purposes, to properly define a chord as (2.) a *set of pitch-classes*, one simply lists the pitch-classes – e.g. [C, Eb, E, F, F#, G].

¹²⁹ Forte, Allen: *The Structure of Atonal Music*, New Haven and London: Yale University Press (1973).

¹³⁰ Bacon, Ernst Lecher: ‘Our Musical Idiom’ in *The Monist*, vol.27 issue 4 (October 1917), pp.592-603.

¹³¹ See this paper, p.1, footnote 5.

To define a chord as (3.) a set of intervals between adjacent pitches, one may use numbers to represent the distance, in semitones, between pitches. '1' denotes a semitone; '2' denotes a tone, '3' denotes a minor 3rd, etc.:¹³²

Madame de Meuron

p.36, b.289



Steven Stucky ([1981] 2009),¹³³ Charles Bodman Rae ([1994] 1999)¹³⁴ and others have employed a related system to classify sonorities in the music of Lutosławski. But there is a crucial difference: both authors use numbers to denote *interval-classes* between pitches, rather than *intervals* between pitches. Under such a system, one would annotate chord xx as follows:



Stucky and Rae's system might seem preferable to some, perhaps – at least in analysing certain aspects of Lutosławski's practice. But the four chords listed below are not equivalent in any sense that might be considered useful for the purposes of this paper:

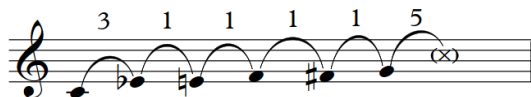
By <i>interval-class</i> (Rae/Stucky system)				By <i>interval</i> (this paper)			
<u>xx.</u>	<u>xxi.</u>	<u>xxii.</u>	<u>xxiii.</u>	<u>xx.</u>	<u>xxi.</u>	<u>xxii.</u>	<u>xxiii.</u>

¹³² The earliest example of this practice that I now know of is in Bacon, Ernst Lecher: op.cit. (1917), p.580. My own use of it originated from adapting the system employed by Rae, Stucky and other analysts, described above.

¹³³ Stucky, Steven: *Lutosławski and his Music*, New York: Cambridge University Press, ([1981] 2009), p.81 and elsewhere.

¹³⁴ Rae, Charles Bodman: *The Music of Lutosławski*, London: Faber, ([1994] 1999), p.59 and elsewhere.

Finally, to define a chord as (4.) a set of interval-classes between adjacent pitch-classes, one may take the *set of pitch-classes* and use numbers to represent the distance, in semitones, between each.¹³⁵ One covers the full octave. Therefore, for any set, the numbers will add up to 12:



For clarity and consistency, the smallest number in the set is placed first. If there are two or more such numbers, one considers the next interval-class in the sequence, and places the smallest number first. Thus, for chord xx, the correct order is **111153**.

Under this system, inversionally-related¹³⁷ interval-class sets are distinct. Inversions can be spotted or determined instantaneously. One simply reads the numbers backwards, keeping the smallest number(s) at the beginning in place. Thus, **129** inverts to **192**, **1227** inverts to **1722**, **111153** inverts to **111135**, and so on.¹³⁸

The 19 trichords are classified here. 'X' = 10 semitones. Shaded sets are uninvertible:

11X			
129			
138	228		
147	237		
156	246	336	
165	255	345	
174	264	354	444
183	273		
192			

¹³⁵ Bacon does precisely the same thing, and comes up with a very similar system.¹³⁶ The only significant difference between Bacon's taxonomy and that employed in this paper is that Bacon does not normally cover the full octave. Of the 214 sets comprising between 2 and 6 elements, Bacon lists the final interval-class on only 34 occasions, in brackets: he does not deem it essential, as I do.

If one: a) considers 'pitch-class sets' in terms of what they actually specify – not *sets of pitch-classes* but sets of *interval-classes* between adjacent pitch-classes –, and b) represents these interval-classes as numbers, one inevitably ends up with something close to Bacon's classification, as I have done.

¹³⁶ Bacon, Ernst Lecher: op.cit. (1917), pp.580, 592-603.

¹³⁷ In the Fortean or Schoenbergian sense, that is.

¹³⁸ This is only possible if one includes the final interval-class, to make up the octave. It is the primary reason for my having done so. That Bacon does not accommodate this possibility in 1917, prior to Schoenberg's development of serialism, is hardly surprising. Bacon does consider *Rameauan* inversion.¹³⁹

¹³⁹ Bacon, Ernst Lecher: op.cit. (1917), pp.603-605.

The 43 tetrachords may be classified thus:

1119							
1128	1218						
1137	1227	1317					
1146	1236	1326	1416				
1155	1245	1335	1425	1515			
1164	1254	1344	1434	1524			
1173	1263	1353	1443	1533	1623		
1182	1272	1362	1452	1542	1632	1722	

2226							
2235	2325						
2244	2334	2424					
2253	2343	2433					
			3333				

The remaining sets need not be listed here, since the principle is now clear enough.

One feature of Forte's system may serve our purposes more usefully, on rare occasions: the interval-class vector.¹⁴⁰ This vector lists the total number of interval-classes between the various pitch-classes of a given set, rather than simply the interval-classes between *adjacent* pitch-classes. For example: [2, 1, 2, 3, 2, 0] indicates two semitones, one tone, two minor 3^{rds}, three major 3^{rds}, two 5^{ths} (strictly speaking, 4^{ths}),¹⁴¹ and no tritones.

We may thereby quantify two useful characteristics of a given interval-class set. First, the number of sensory dissonances:

- Semitones (and therefore major 7^{ths} and minor 9^{ths}) are strong sensory dissonances.¹⁴²

¹⁴⁰ Forte, Allen: *The Structure of Atonal Music*, New Haven and London: Yale University Press (1973), pp.15-18 and 179-181. Forte's term is 'interval vector', but these are interval-classes and not intervals.

¹⁴¹ That is: a 4th will often be heard as an inverted 5th. For example, within a dyad consisting of C and F, F forms a more natural root than C in most spacings and contexts. Therefore, although the 4th is the smaller interval, it is more useful to think of this interval-class harmonically as a 5th, rather than a 4th. With the other five interval-classes, however, it makes better musical sense to think of the smallest representative interval – the semitone, tone, minor 3rd, major 3rd and tritone respectively.

¹⁴² In this, I am following Plomp and Levelt (op.cit., 1965). See this paper, p.20. My terminology is partly borrowed from Ernst Krenek (1940), who classified semitones as 'sharp dissonances'¹⁴³ and tones as 'mild dissonances'.¹⁴⁴ However, Krenek considered the tritone a 'neutral interval'.¹⁴⁵ From the later research of Plomp and Levelt (1965), we can establish that on this last point, Krenek was mistaken.

¹⁴³ Krenek, Ernst: *Studies in Counterpoint Based on the Twelve-Tone Technique*, New York: Schirmer (1940), p.7.

¹⁴⁴ Ibid., p.7.

¹⁴⁵ Ibid., p.8.

- Tones (also, therefore, minor 7ths and major 9ths) and tritones are mild sensory dissonances.

Second, the number of interval-classes conducive to *Klangverwandtschaft*:

- 5ths (strictly speaking, 4ths) are strongly conducive.
- Major 3rds, tones and minor 3rds are fairly conducive.

We may now begin the process of analysing my harmonic technique – the focus of this paper.

5. Techniques of Chordal Spacing

Within equal temperament, each of the 352 interval-class sets, and therefore each of the 4,096 *sets of pitch-classes*, contains latent *affinities* (*Klangverwandtschaften*) between subsets of pitch-classes, and/or among the entire set. If a given chord is spaced with sufficient transparency to allow the ear to pick out some of these latent *affinities*, this will establish one or more audible roots, albeit to varying degrees of strength. That is: I advance that the clearest way to render these inherent relationships readily audible within a single vertical sonority is often to space it as a polychord. Evidently, the larger the *set of pitch-classes*, the truer this becomes. Of the 352 interval-class sets, well over 300 are intrinsically polychordal.

For all sets larger than trichords, there are numerous spacing solutions, allowing the composer to control: a) voice-leading; b) in most cases, which of several possible pitch-classes are heard as roots; and c) the perceptible strength of, and balance between, such roots. I know of no better route to coherence in ostensibly ‘atonal’ harmony than to consistently illuminate sonorities in this manner. One may also clarify and control the *affinities* of dyads and trichords through spacing – the obvious differences being: a) almost invariably, one generates only a single root; and b) the range of solutions is narrower.

If, besides clarifying *Klangverwandtschaften*, one also exploits spacing and register to attenuate the effect of sensory dissonances to whatever degree is expressively necessary, one can also achieve euphony with any of the 4,096.

We will begin by briefly considering the relatively straightforward case of the 19 trichordal interval-class sets. Thereafter, as we examine progressively larger sets over Chapters 5 and 6, our focus will turn increasingly towards techniques of polychordal spacing. By Chapter 6, all sonorities will be polychords.

It is of course one thing to dissect the roots and *affinities* of sonorities as I hear them, and another to consider other listeners' perceptions. In the final part of this chapter, we shall reflect on the latter aspect, albeit only briefly and speculatively, drawing on a single study carried out by William Forde Thompson and Shulamit Mor (1992)¹⁴⁶ in a related area. But for now, the focus remains on my chordal spacing techniques themselves, for which I am guided by *my own ears*.



a. Trichordal interval-class sets

'Given the wide range of tonal implications within T_n -types of cardinality 3 [*i.e. trichordal interval-class sets*] (and any other cardinality for that matter), it is surprising that many pc-set [*i.e. so-called 'pitch-class set'*] theorists tacitly consider all pc-sets *a priori* to be equivalent or value-free, as if they had no tonal implications – or as if tonal implications did not exist. Can the tonal implications that we learn from music simply disappear (which is psychologically implausible), or are they arbitrary (which is psychoacoustically and ethnomusicologically implausible)? It may be possible to make tonal implications disappear in a magical, ideal world of mathematics located in a far-off galaxy and inhabited by aliens, but in real music heard by real human beings, pc-sets will always have tonal implications. Moreover, the appeal of so-called atonal music may be due not to an absence of tonal implications, but to their multiplicity, fluctuation and intangibility.'¹⁴⁷

Aside from the last word, I concur. The final sentence from Richard Parncutt (2009) quoted above recalls Reti's description of 'a diversity of tonical impulses [which] elevates the atonal shapes to a design of uninterrupted coherence'.¹⁴⁸ Parncutt subsequently attempts to demonstrate, without any specific musical illustration, that all trichordal interval-class sets possess clear 'tonal implications', with the partial exception of a single trichordal set – **11X** – which he considers to have 'almost no tonal implications... [although] even this is not quite true.'¹⁴⁹ Although 'tonal implications' is not a phrase that I would normally employ, in this case the facts are clear: over and above Parncutt's observations, 18 of the 19 trichordal interval-sets palpably possess *diatonic* tonal implications:

¹⁴⁶ Thompson, William Forde and Mor, Shulamit: 'A Perceptual Investigation of Polytonality' in *Psychological Research*, vol. 54 (1992), pp.60-71.

¹⁴⁷ Parncutt, Richard: 'Tonal Implications of Harmonic and Melodic T_n -Types' in *Mathematics and Computing in Music*, ed. Timour Klouche and T.Noll, Berlin: Springer (2009), pp.126-7.

¹⁴⁸ Reti, Rudolph: op.cit. (1958), p.69. See also this paper, p.10.

¹⁴⁹ Parncutt, Richard: op.cit. (2009), p.126.

- Major triad: **354**.
- Minor triad: **345**.
- 7th chords of various kinds: **138***, **147***, **174**, **237**, **273**, **246***.
- 9th chords of various kinds: **129**, **192**, **138***, **228**.
- Diminished triad: **336**.
- Augmented triad: **444**.
- Unresolved suspensions, all anchored by 5ths: **147***, **156**, **165**, **255**.
- Unresolved double suspension (or else French 6th, minus one pitch): **264**.
- Italian 6th: **246***.
- Major/minor chord: **183**.

** denotes sets which may serve more than one diatonic function, depending on spacing and context.*

Of the sets listed above, 17 can easily function diatonically. Less directly, the same is true of the 18th set, **183**.¹⁵⁰ Therefore, **11X** aside, when considering trichordal sonorities *in isolation*, questions of spacing, *Klangverwandtschaft* and chordal roots are self-evident. We shall examine **11X** in the following section of this chapter: its latent harmonic implications are best considered in relation to a family of tetrachords with which it shares certain distinctive characteristics.



b. Tetrachordal interval-class sets

In technical terms, tetrachordal sets represent the best starting-point for analysis. The size of these sets dictates that whilst many can be spaced polychordally, this aspect must always remain modest, and therefore relatively easy to examine.

¹⁵⁰ Granted, **183** could only appear within a jazz or blues idiom, and the lack of a 5th renders it somewhat unusual. But the root of **183** is absolutely clear, as are its potential harmonic functions within those idioms.

Within this portfolio, the most productive sources of clear-cut tetrachordal spacings are certain passages from *The Art of Thinking Clearly*. For expressive reasons, most of these chords possess a certain coarseness, appropriate to the titles of the sections in which they appear – ‘How to Expose a Charlatan’, ‘The Stone-Age Hunt for Scapegoats’ and ‘Authority Bias: Don’t Bow to Authority’. It should be emphasised that a concern with euphony does not prescribe that all chordal sonorities must be pretty. The interval-class make-up of certain sets will always, up to a point, determine a certain range of possible expressive attributes. In determining chordal spacings, one is free to select from anywhere among that range of attributes. Part of the coarseness of many of the chords given below stems from their interval-class sets, all of which contain high levels of sensory dissonance. Furthermore, for aesthetic reasons, those chords that feature in one or more of the three passages listed above are invariably restricted to a low register. The two middle-register chords – *xxv* and *xxxii* – occur in another passage, of a contrasting expressive nature – ‘Drawing the Bull’s Eye Around the Arrow’. Certain other tetrachords featuring in *Madame de Meuron* are also given here; these are also restricted to a low register.

The simplest method of establishing chordal roots is through 5^{ths}. Certain types of interval-class set, by their very nature, prescribe that 5^{ths} will provide the main source of *Klangverwandtschaft*, and therefore roots. **1155** – Forteian interval-class vector [2,1,0,0,2,1]¹⁵¹ – is such a set. Six chordal spacings are given below:

The image displays six musical chords, labeled *xxiv* through *xxix*, arranged in two groups. The first group, under the heading 'The Art of Thinking Clearly', includes chords *xxiv*, *xxv*, *xxvi*, and *xxvii*. The second group, under the heading 'Madame de Meuron', includes chords *xxviii* and *xxix*. Each chord is shown on a grand staff (treble and bass clefs). Below each staff, the chord is identified by a letter and a superscripted number (e.g., E_b^9 , $F^\sharp^{11\#}$, $[f]$, B^9 , A^9 , F^9). The notation also includes interval-class vectors and page references for each source.

¹⁵¹ That is, the total number of interval-classes between pitch-classes comprises two semitones, one major 2nd, no minor 3^{rds}, no major 3^{rds}, two 5^{ths} (or 4^{ths}) and one tritone. (See this paper, p.38.) The semitones and tritone are relatively uncondusive to *affinity*. The major 2nd merely reinforces the same potential root as one of the 5^{ths}. With no minor or major 3^{rds}, the 5th will therefore tend to dictate *Klangverwandtschaft*.

Spacings xxiv and xxvii are straightforwardly anchored by a single root. Spacings xxv, xxviii and xxix are polychords: that is, two roots are audible. The *primary* (stronger) root, as I hear it, is given in red; the *secondary* root in green. In each of the polychords above, the relative strength of the primary and secondary roots is quite finely balanced: perhaps some listeners might perceive the hierarchies differently. Where the lower portion of a polychord is in root position, one might expect that the lowest note of the chord will serve as the primary root. But in all three cases, the interval-classes most naturally conducive to generating *Klangverwandtschaft* – 5ths and major 2nd – are confined to the three upper voices. In both xxviii and xxix – very similar spacings – the gap of almost two octaves between the lowest two voices helps bring these *affinities* into sharper focus. Even under these conditions, the low Bb 7th (xxviii) and Gb 7th (xxix) exert some gravitational pull. But to my ears, in both cases, the strength of the *affinities* outweighs the pull of the bass register.

Chord xxvi is singularly atypical of my practice, in that a root is deliberately not established. The chord serves our present purposes by illustrating precisely how *not* to generate either euphony or chordal roots – in contrast to the other examples. The spacing of xxvi is intentionally grotesque. Two rules are purposely broken, to achieve this effect. Firstly, the low 4th muddies the sonority. Higher up, one might hear it as an inverted 5th, with the F functioning as a root, but with such a narrow interval in such a low register, this is only possible if the rest of the chord helps to clarify the relationship. That does not happen. Furthermore, by placing the *interval-class* semitones adjacently (F – F# – G), I intensify the bite of **1155**'s inherent sensory dissonances. In context, xxvi is a *tendance*, lasting only a semiquaver, progressing to a more grammatically comprehensible, albeit similarly unsubtle chord, also a *tendance*, also constructed from the same interval-class set – xxvii. These two chords provide a stinging punctuation point (p.21, b.285) – one of several similar moments in 'How to Expose a Charlatan', and certainly the most extreme in terms of chordal spacing.

On considering each size of interval-class set as a collective – dyads, trichords, tetrachords, etc. –, each exhibits different general tendencies, and therefore poses distinct challenges. One such

challenge arises from the relative scarcity of 5^{ths} in smaller sets, given that the 5th is the interval most naturally suited to establishing *Klangverwandtschaft*:¹⁵²

Size of set	# of sets	# with 5 ^{ths} versus # without 5 ^{ths}	% with 5 ^{ths}
0-2 elements	8	1:7	13%
Trichords	19	9:10	47%
Tetrachords	43	33:10	77%
Pentachords	66	63:3	95%
Hexachords	80	79:1	99%
7-12 elements	136	136:0	100%
Total	352	321:31	91%

As we have seen, almost all trichordal sets can function *diatonically*. However, only half of those include the 5th. Those that do not, whilst diatonically permissible in the right circumstances, are on the whole less frequently encountered in such contexts.

The larger the set, the wider the range of spacing options. Whilst sets comprising five or more elements generally contain more sensory dissonances, they also contain more intervals conducive to *Klangverwandtschaft*, and more sensory consonances. Hence, in expressive and technical terms, in generating polychordal spacings, one is progressively less restricted by the interval-class make-up of the set: paradoxically, larger interval-class sets are thus, in some respects, easier to work with.

Thus, tetrachords occupy a unique position – large enough to require polychordal spacing in many instances, but small enough to impose substantial constraints. None more so than the ten tetrachordal sets that are devoid of 5^{ths}. The six which also feature semitones require especially careful handling. These, along with **11X**, **11118** and **11262**, are the only nine sets among the 352 to combine a) inherent polychordality, b) an absence of 5^{ths}, and c) strong sensory dissonance – *very* strong in seven cases. As such, these nine pose a unique technical challenge, and inherently mark an expressive extreme. However, even under such restrictive conditions, one can establish both roots and a certain brand of euphony, where desirable:

¹⁵² See this paper, p.22.

1119 The Art of Thinking Clearly
p.22, b.295 p.2, b.25 p.29, b.393

xxx. xxxi. xxxii.

F $\overset{9}{\underset{7\sharp}{m}}$ E m
E $\overset{9}{\underset{7\sharp}{m}}$ Eb m⁹
G# m⁹ Bb $\overset{9}{\underset{7\sharp}{m}}$

1128 The Art of Thinking Clearly
p.1, b.6

xxxiii.

A $\overset{9}{\underset{7\sharp}{m}}$ G M $\overset{9}{\underset{7\sharp}{m}}$ G# m

1182 The Art of Thinking Clearly
p.2, b.23 p.21, b.277

xxxiv. xxxv. xxxvi.

C Mm⁹ C# $\overset{9}{\underset{7\sharp}{m}}$ B Mm⁹
B Mm Eb $\overset{7\sharp}{m}$

1218 The Art of Thinking Clearly
p.2, b.23 p.21, b.285

xxxvii. xxxviii. xxxix.

G Mm $\overset{9}{\underset{7\sharp}{m}}$ F m $\overset{9}{\underset{7\sharp}{m}}$ G m $\overset{9}{\underset{7\sharp}{m}}$
Ab m⁹ E Mm F# Mm

1263 The Art of Thinking Clearly
p.23, b.305

xl.

Ab $\overset{9}{\underset{7\sharp}{m}}$ E m

1362 The Art of Thinking Clearly
p.1, b.6

xli.

C m⁹ Eb m

Given the relatively challenging interval-class content, whenever the bass register is employed, the interval between the two lowest voices is crucial. In every example given above, barring the

exceptional case of xxxvi, this interval is larger than an octave, to aid aural clarity. In the absence of a 5th, a major 9th can prove an invaluable resource for establishing *Klangverwandtschaft* in this register, accounting for 8 of the 12 solutions here.¹⁵³ In each instance, this sets up the lowest pitch of the chord as a root; usually the primary root – evidently a limitation. The 10th in spacing xxvii similarly imposes root position. With xxxi, although in isolation there would otherwise have been little or no discernible *affinity* between the bass E and tenor F, this factor is provided by the Gb: in effect, xxxi is simply yet another sonority anchored by a 9th (E to enharmonic F#).

Likewise, with the trichordal **11X**, in the absence of the 5th, one may establish *affinity* via a major 9th, as in spacing xliv below. In a higher register, a major 2nd can fulfil an equivalent harmonic role, as in xliv. Alternatively, under the right conditions, a minor 7th may establish a root, as in xliv:

11X	Madame de Meuron p.36, b.289	Capriccio, I p.2, b.32	Velvet Revolution p.46, b.290
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With relatively problematic sets such as those considered here, context also plays a vital role. If every surrounding chord possesses clear roots, this helps to present a set such as **11X** in a clearer harmonic light, as is the case in the following phrase from *Velvet Revolution*.¹⁵⁴

Velvet Revolution p.46, b.289-290

¹⁵³ The *affinity* of the 9th is essentially that of the major 2nd. See this paper, pp.23 and 39. Later in this chapter, we shall further consider the use of major 9^{ths} between the two lowest voices.

¹⁵⁴ *Velvet Revolution* – audio file, 7:57-8:01.

We may now return to the tetrachords listed on page 46. Spacing xxxvi is unusual – partly the result of voice-leading decisions, partly reflecting the need to provide contrast between successive sonorities. The major 7th between the lowest voices is a relatively weak generator of *affinity*. I consider that the B at the top of the sonority provides its primary root. The C# can be heard as a supertonic to it more clearly than the D can be heard as a 7th of the Eb – not only due to the relative closeness of *affinities* between the former pair, but due to registral considerations: the higher part of the chord is heard in sharper focus in this instance. Furthermore, since the D and D#/Eb can be heard as minor and major mediants to the B, in the absence of the 5th, most of the natural interval-class generators of *affinity* points towards the same root.

At first glance, the case that xxxiii possesses *three* roots – extraordinary for a chord containing only four pitches – might appear tenuous. However, in context, the picture changes. Xxxiii is followed by xli, producing the following:

The Art of Thinking Clearly
p.1, b.6, first beat

In B major: VI - III

In C major/
minor: V⁹ - I⁹

The progression of the two higher voices suggests a diatonic connection. In isolation, the A in xxxiii seems stronger than the G#. However, in context, retrospectively, after hearing xli, the G# plausibly constitutes a tertiary root, since we are more likely to hear this part of the texture diatonically as a simple step from G# to D# (perhaps VI to III in B major), than as a lurch from A₇⁹ to D#. That leaves a straightforward V⁹-I⁹ progression in C between the primary roots. In practice, the progression is very swift. Nonetheless, the importance of G# root is aurally unmistakable.

By conceiving each sonority polychordally in this manner, I allow a much richer web of *audible* harmonic pathways to emerge. That is, roots that might seem subsidiary or even negligible within individual chords presented in isolation can, in practice, take on vitally active harmonic roles in the right musical contexts, as illustrated above. In the twelve chords given on page 46, absolutely every secondary element – the E minor element in xxx, the Eb minor element in xxxi, and so on – possesses that potential. Our ears are simply drawn, intuitively, to the most plausible harmonic pathways from chord to chord.



c. Hexachordal interval-class sets

By comparison with smaller sets, pentachords, hexachords and heptachords present a different order of expressive and technical opportunities: richer and more varied potential combinations of latent *affinities*, and a wider choice of strategies through which to exploit these.

Madame de Meuron contains numerous hexachords, covering roughly half of the 80 possible *interval-class sets*.¹⁵⁵ As before, where these sets recur several times with different spacings, we can examine a range of approaches to the same harmonic material. **111135**, for example, is presented in several vertical forms, including the following five:

111135 Madame de Meuron

p.33, b.263

xlvi.

xlvi. p.36, b.290

xlvi. p.36, b.293

E^{7_b} C#m⁹

C Mm^{9_b}

G Mm^{9_b}

C Mm^{9_b}

¹⁵⁵ This was by chance rather than by conscious design.

The image displays two musical examples, *xlvi* and *xlix*, on a grand staff (treble and bass clefs). Example *xlvi* is labeled 'p.43, b.357' and features a complex chord structure with annotations for roots and intervals. A red dashed line indicates a root of C, and a green dotted line indicates a root of F. The chord is labeled 'F Mm⁹' and 'F# m⁹'. Example *xlix* is labeled 'p.43, b.359' and features a complex chord structure with annotations for roots and intervals. A red dashed line indicates a root of C, and a green dotted line indicates a root of A. The chord is labeled 'A^b Mm⁹' and 'A⁹ 7#'. The notation includes various accidentals (sharps, flats, naturals) and interval markings (9, 7#).

In spacing *xlvi*, C is unquestionably the strongest root, audibly anchoring every other pitch – even the high Db can be heard as a flattened supertonic. The E and C#/Db roots are much subtler. This spacing is essentially a fuller version of the tetrachordal *xxxiiv* (p.46), with an added G and Db. The G strengthens the C root considerably further, especially given its registral position. Consequently, neither the C#/Db nor the E root affect the balance of *affinities* nearly as much as they would otherwise have done.

Spacings *xlvi* and *xlvi*, likewise, are strongly anchored to a single pitch, to the point where, to my ears, there are no secondary or tertiary roots. That said, the threshold at which a subsidiary root becomes audible is difficult to define, and will surely vary from listener to listener. One might perhaps conceivably hear an Ab minor 9th at the bottom of *xlvi*, with a Bb 7th higher up, or perhaps an E minor 7th in the lower half of *xlvi*. The distinction between these possible secondary and tertiary *affinities* and those arguably manifest in *xlvi* is slight. In fact, poietically, there is no real difference: the underlying principles and techniques are the same, and since both are deeply ingrained, in practice I space such chords entirely by intuition.

Arguably, in all five cases above, the strongest root is established by the same element within the *interval*-class set (red – see below). Further, three of the subsidiary roots are established by the same element (green dotted line below). This is due to the inherent nature of **111135**. The simultaneous presence of major and minor triads with the same root, alongside relatively modest latent *affinities* elsewhere, tends to tip the balance in the same direction, as illustrated here:

The sets of *pitch-classes*, showing roots.

The image shows five hexachords on a single staff, labeled *xlvi*, *xlvi*, *xlvi*, *xlvi*, and *xlvi*. Each hexachord is represented by a staff with notes and labels below. The labels are: *xlvi* C# m, *xlvi* C Mm, *xlvi* G Mm, *xlvi* F# m, *xlvi* F Mm, *xlvi* A Mm, and *xlvi* B M. Some labels have superscripts like 9, 7#, 6, 7#.

That the ascendancy of one element is all but prescribed by the interval-class make-up of **111135** accounts for the fact that in each of the four mid-to-high register spacings, the primary root, as I hear it, is relatively high in the chord. Where the lowest pitch is established as a root – the A in *xlix* –, it remains appreciably less potent than the Ab higher up. That said, within *xlvi*, the margin by which F is stronger than F# is slight: the lowest four pitches, in isolation, are clearly anchored to F#.

111135 is one of the most sensorily dissonant among hexachordal interval-class sets. However, the larger the set, the greater the potential to attenuate sensory dissonance, if so desired. Thus, like the Messiaen chord quoted in Chapter 3 (p.32, spacing *xlviii*) each of the five distinct spacings given above avoids not only adjacent semitones, but also adjacent major 7^{ths} and minor 9^{ths}. Furthermore, spacings *xlvi*, *xlvi*, *xlvi* and *xlvi* each break up four of a cluster of five adjacent semitones among the constituent *set of pitch-classes* through essentially the same spacing device found in the Messiaen chord. The pitch-class cluster is split registrally into two pairs of tones (blue) – thus, mild sensory dissonances are emphasised over strong sensory dissonances:

The image shows two musical examples. On the left, the 'Messiaen' chord is shown in a grand staff with notes in blue. On the right, the 'Madame de Meuron' chord is shown in a grand staff with notes in blue. The chords are labeled *xlvi* and *xlvi* respectively.

In each chord, this device also serves to further clarify *affinities*. In *xlvi*, for example, the registral split hints at two separate scales sharing the same root and dominant: one featuring [C, D, E, G] – perhaps C major; the other including [C, Db, Eb, G] – perhaps C Phrygian.

There are, of course, other methods of breaking up semitone pitch-class clusters. Spacing *xlvi*, for example, inverts the pairs of tones to minor 7^{ths}:



Interval-class set **111612**, in stark contrast to **111135**, possesses a fairly even balance between latent *Klangverwandtschaften*. Whilst a given chordal spacing of **111612** can be configured so that the primary root thoroughly overpowers the others – such as in *l* and *liv* below – that primary root is not pre-ordained by the intervallic relations among the set, as was almost the case with **111135**. Evidently, the larger the *set of pitch-classes*, the less frequently one encounters sets such as **111135**: past a certain point, it becomes mathematically impossible for all – or even most – of the strongest latent *affinities* to point in the same direction.

Very much unlike the hexachords considered hitherto, then, each of the five chordal versions of **111612** given below establishes a different hierarchy among its latent interval-class *affinities*. To my ears, between the five spacings, all six elements of the set are used as roots. Furthermore, arguably, depending on how one hears the balance between *affinities* in *li*, *lii* and *liii*, each of the five solutions might be considered to employ a different element as its primary root:

111612 Madame de Meuron

p.33, b.260

p.36, b.291

p.36, b.296

p.43, b.355

lii.

p.56, b.453

liv.

The sets of pitch-classes, showing roots.

l.

li.

lii.

liii.

liv.

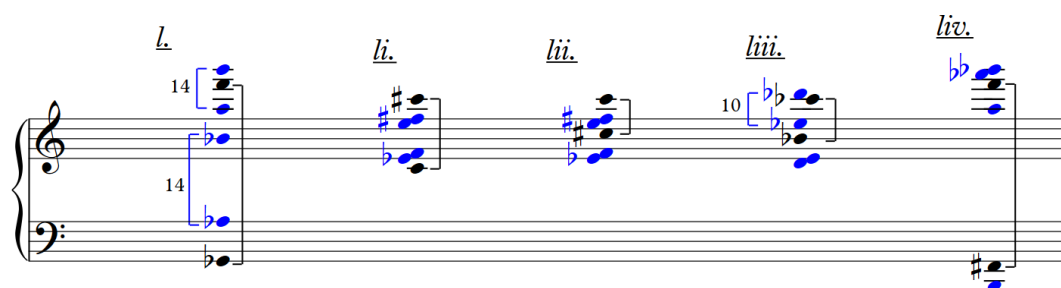
There are two 5^{ths} within **111612**'s interval-class vector, potentially setting up elements 3 or 4 as roots. In *li*, both 5^{ths} establish rival roots. F (element 3) is reinforced by its position lower in the chord, but also undermined, since its supporting 5th is inverted to a 4th. F# (element 4) is reinforced by the C# above, but also undermined by the pitches below. Whilst I hear the F as marginally stronger, there is very little in it: some listeners might perceive the F# root more strongly. Through other spacings of **111612**, it is nevertheless possible to establish a definitive aural hierarchy between elements 3 and 4: in *liv*, the 5th in the bass register firmly establishes element 4 (B) as the primary root. By contrast, in *l*, element 4 (B again) cannot possibly be heard as a root at all, let alone a primary root, given its registral position relative to F#/Gb. In this case, of the two elements in question, element 3 (Bb) exerts the stronger harmonic pull, serving as a secondary root.

Alternatively, elements 5 or 6 can be established as roots via the combined action of minor and major 3^{rds}: this can prove sufficient to override the two 5^{ths}. The primary root of *l* is unquestionably Gb/F# (element 6): the Bb and A are clearly audible as major and minor mediants, with the Ab further reinforcing the *Klangverwandtschaft*. In *liv*, F (element 5) clearly operates as a secondary root, similarly supported by its two mediants.

Spacing *lii* demonstrates that element 1 (Eb) can also serve as a root, supported by a minor 3rd, minor 7th and major 2nd. Indeed, I hear Eb as the primary root of the chord, although the balance between it, Db/C# and F# is fine. Since the Db/C# and F# components are both presented as inversions, their potency is reduced. Eb, meanwhile, gains strength as the lowest pitch of the chord.

Spacing *liii* is even more ambiguous; there is little to choose between the three roots. There would seem to be two main causes for the ambiguity. First, the hierarchy of the registral positions of the three roots (D strongest, then Bb, then Eb) reverses the inherent hierarchy of their interval-class *affinities* (Eb strongest, then Bb, then D). Second, the low D and E lie almost diametrically opposite both of the higher roots (Eb and Bb) in the circle of 5^{ths}, thus – given their register – undermining both. Element 2 (D) is only reinforced by a supertonic: in interval-class terms, it is the least plausible of all six elements as a potential root, but here its registral position is optimal.

Although in gravitational terms, spacings *li*, *lii* and *liii* are ambiguous, all three are highly pleasing to the ear. This is a product of the combined action of a) the ‘sonorous ring’¹⁵⁶ of each carefully-spaced *affinity* and b) the cushioning of sensory dissonances. We have previously seen how these same factors induce euphony in chords *xviii* (Messiaen, p.32), *xix* (Takemitsu, p.33) and *xlv-xlix* (pp.49-52.) Again, registral separation is vital in mitigating **111612**’s many sensory dissonances, with a 4-semitone interval-class cluster variously broken up via paired tones, minor 7^{ths} and major 9^{ths} (blue). Again, semitones are strictly avoided, with just two strong dissonances between neighbouring pitches – the major 7^{ths} in *l* and *li*:



¹⁵⁶ Cazden, Norman: op.cit. (1980), p.126. See this paper, p.24.

In contrast to the mid to low-register tetrachords from the *The Art of Thinking Clearly* discussed earlier, of the ten hexachordal spacings examined up to this point, only three feature the bass register. The following short hexachordal passage from *Madame de Meuron*, featuring chords *xlv* and *l*, allows us greater emphasis on this aspect:

Madame de Meuron
pp.33-34, b.259-264

Primary roots: C# Mm^{7#}₆ G M^{7#} Bb m⁹_{7#} D M^{7#} Gb Mm¹¹_{7#} Db M⁹_{7#} B m⁹₆ Bb m⁹_{7#}

Secondary roots: C M¹¹₇ G# m⁷ A Mm⁹ F#⁹₆ Bb^{7#} C M¹¹ G⁹ A Mm

xlv.

263

E M⁹_{7#} F Mm¹¹₁₁ C Mm⁹_{9b} F# Mm^{6b}

G B^{7#}₆ E^{7#}₆ D⁶

This passage aside, my approach to spacing does not simply consign the two lowest voices to an endless succession of 5^{ths} and major 9^{ths}, as soon as the bass register is included. Tetrachordal spacings such as *xxviii*, *xxix* (p.43), *xxxvi* and *xxxvii* (p.46) have already illustrated other possibilities. But in general terms, I consider these the two most useful intervals for clarifying roots in this register. The importance of the 5th is self-evident. The 9th is closely related – audible as the 5th of the

5th.¹⁵⁷ Arguably then, where 9ths appear in this register, a 5th above the bass might perhaps be, in Rameauan terms, *implied*. That is:

‘The word “imply” indicates that sounds thus designated might be heard in chords in which they are not actually found.’¹⁵⁸

One might then hear the progression of the lowest voices effectively as follows:



Implied pitches (non-sounding) are in blue.

In practice, the open 9ths create a little more registral space; this is essential to avoiding excessive muddiness in such a rich chordal progression. There are evident drawbacks to the device: the voice-leading between the lower parts remains rudimentary, and after a certain stretch, the ear will tire of hearing the same intervals in the same register. However, in the relatively short term, under the right conditions, a succession of 5^{ths} and 9^{ths}, closely bound in acoustic terms, can help give both coherence and continuity to a progression of complex chords.¹⁵⁹

From a technical angle, if one so desired, one could rely exclusively on 5^{ths} and 9^{ths} in most, if not all hexachordal contexts, with this type of registral spread – as I have done in the example above – without encountering any significant technical impediments. Of the 80 hexachordal interval-class sets, 78 offer *both* options.¹⁶⁰ Moreover, crucially, since there is a wide selection between 4-9 possible pairs of pitch-classes within the set, on each occasion, there is ample scope for controlling

¹⁵⁷ See also this paper, pp.23, 39 and 46-47.

¹⁵⁸ Rameau, Jean-Philippe: *Treatise on Harmony*, transl. Philip Gossett, New York: Dover, ([1722] 2014), p.xlv.

¹⁵⁹ However, where manifest, this is merely one of numerous factors working simultaneously towards those ends. Besides 5^{ths}, 9^{ths} and other spacing considerations, I employ a range of appreciably more advanced techniques to ensure harmonic coherence in complex chordal progressions. We shall consider these in Chapters 7 and 8.

¹⁶⁰ The two exceptions are **131313**, which allows 5^{ths} but not 9^{ths}, and **222222**, which allows 9^{ths} but not 5^{ths}.

the progression of chordal roots.¹⁶¹ Indeed, across the extended pentachordal to hexachordal progression between b.247 and 270 (pp.31-35) of *Madame de Meuron*, only one chord breaks the chain of 5^{ths} and 9^{ths} (p.32, b.255). Naturally, in most contexts, the inclusion of other intervals besides the 5th and 9th adds welcome variety.



d. Listeners' perception of polychords

During the process of composition, I operate spontaneously on the basis of what I find aurally convincing. It is normally only during the process of analysis that I thoroughly and consciously evaluate how I hear the harmony – in this case, the balance of roots within any isolated chord.

What *others* find aurally convincing is another matter. It would be unwise to make assumptions about how other listeners hear the chords examined in this chapter. At best, I can offer a tentative hypothesis on the basis of a perceptual study by William Forde Thompson and Shulamit Mor (1992)¹⁶² covering a manifestly distinct musical idiom and technique from my own – the polytonality of Darius Milhaud and his pupil, Pierre Max Dubois. Thompson and Mor's methodology derives from one employed by Carol Krumhansl (1979)¹⁶³ and others, in which volunteers listen to diatonic musical extracts and rate the 'goodness of fit'¹⁶⁴ of various pitches, sounded as separate 'probe tones'.¹⁶⁵ Krumhansl and other researchers thereby ascertain 'some important properties of listeners' long-term knowledge of musical key',¹⁶⁶ including that 'tonal contexts establish a [specific]

¹⁶¹ See this paper, pp.11-13.

¹⁶² Thompson, William Forde and Mor, Shulamit: 'A Perceptual Investigation of Polytonality' in *Psychological Research*, vol. 54 (1992), pp.60-71.

¹⁶³ Krumhansl, Carol: 'The Psychological Representation of Musical Pitch in a Tonal Context' in *Cognitive Psychology*, vol.11 (1979), pp.346-374.

¹⁶⁴ Thompson, William Forde and Mor, Shulamit: op.cit. (1992), p.60.

¹⁶⁵ Ibid., p.60.

¹⁶⁶ Ibid., p.60.

perceptual hierarchy'¹⁶⁷ among pitches. Subsequently, on the basis of the expected perceptual hierarchies for *single* diatonic keys, via a further 'probe tone' experiment, Thompson and Mor (1992) could then establish that in one bitonally-*conceived* excerpt from Dubois's *Circus* (1977), listeners do indeed hear both keys simultaneously¹⁶⁸ – albeit with one being perceived somewhat more strongly than the other.¹⁶⁹ However, in another bitonally-*conceived* excerpt from Milhaud's *Sonata n°1 for Piano* (1916),¹⁷⁰ on the whole, listeners perceived only one of the two *poietic* keys.¹⁷¹

I tentatively submit that since it is possible, under certain conditions, for non-specialist listeners to perceive more than one *key* simultaneously, it ought therefore to be possible, under the right conditions, for non-specialist listeners to perceive more than one *chordal root* simultaneously – since keys are dependent on chordal roots. By the same token, since it would appear that many listeners can hear – if not in most cases consciously pinpoint – *hierarchies* between primary and secondary *keys* sounding simultaneously, perhaps many listeners can also broadly hear – if not in most cases consciously identify – the hierarchies between primary and secondary *roots* that I hear within individual polychords, or something similar, under the right circumstances. Nevertheless, equally, on the basis of the Milhaud findings, I cannot assume that any listener will hear a given chord – especially a complex or ambiguous polychord – exactly as I do. In some instances, I might hear multiple roots within a given sonority, where others might hear only one. Or none – although my harmonic methods are specifically designed with the aim of avoiding that eventuality. Indeed, I can categorically rule out any notion that most listeners would consciously perceive precisely the same subtleties in the same manner that I do. I merely operate on the basis that what works aurally for me will hopefully work for others, albeit not necessarily from the same angle.

¹⁶⁷ Ibid., p.60.

¹⁶⁸ Ibid., pp.60-63. I do not have access to a score or recording of the Dubois (1977). Thompson and Mor provide the notated excerpt on p.62.

¹⁶⁹ Ibid., pp.60 and 64.

¹⁷⁰ Milhaud, Darius: *Sonata n°1 for Piano*, op.33 [1916], online audio (16.4.2011): <<https://www.youtube.com/watch?v=fz99HKq-51M>>. The excerpt in question runs from 1:38-1:44.

¹⁷¹ Thompson, William Forde and Mor, Shulamit: op.cit. (1992), pp.60 and 65-68. The notated excerpt from Milhaud (written in 1916, first published in 1920) is given on p.66.

6. Polycadences

Until now, for the most part, our focus has been restricted to isolated chords comprising six pitch-classes or fewer. In analysing the denser sonorities between bars 216 and 220 (p.28) of *Madame de Meuron*, we will begin to consider harmonic temporality, albeit only on a very local level. That is, we will begin to study how the grammatical implications of individual sonorities can play out in practice, from chord to chord.

In this short extract, each sonority consists of an aggregate of two interlocking chords, heard in quick succession – an idea presented and developed elsewhere in the work.¹⁷² In this passage, on each occasion, both interlocking components are already themselves polychords. Since the second interlocking component will always add new roots, following fluently from the multiple roots established in the first component, the effect is normally – in part – of two or more simultaneous progressions of chordal roots. Thus, given the gestural shapes, the impression is – in part – not only of cadences, but of multiple simultaneous cadences. But additionally, elsewhere in the texture, since the roots of the first interlocking component normally continue to be felt once the second component materialises, the listener concurrently perceives, on another level, a single harmonic entity being filled in. To my ears, the polycadential element is normally stronger than the non-cadential ‘single harmonic entity’ element, but the balance varies from pair to pair.

From another angle, the aggregate sonorities in question can be regarded as chord-multiplications of a group of tetrachords. We are examining only the first half of a slightly longer sequence employing the same techniques. In the following transcription, ‘**TM1**’ stands for ‘tetrachord multiplication 1’, and so on:

¹⁷² Some of the high-register hexachords analysed in Chapter 5 are also presented in this manner. This factor was not taken into account in the earlier discussion, so as to avoid introducing too many concepts, too quickly.

Madame de Meuron p.28, b.216-221

TM6 TM5 TM7 TM4 TM8 TM3 TM2 (= TM6 down a tone)

As a chord-multiplication of a small cell, each aggregate is built from a limited number of intervals, in a manner reminiscent of similar polychordal aggregates in certain works by Witold Lutosławski. **TM6**, for example, covers all twelve pitch-classes but is restricted to only two intervals between adjacent pitches – 1 (the semitone) and 4 (the major 3rd). There are clear similarities between **TM6** and the harmonies permeating the entire structure of *Zima* (Winter), one of Lutosławski's *Five Songs* (voice and piano version 1957; orchestral version 1958) – notably the chord quoted below:

Madame de MeuronChord **TM6**

p.28, b.216

intervals (in semitones) →

Lutosławski, Witold: *Zima* from *Five Songs for Female Voice and Piano* [1957]
Celle: Moeck Verlag - no. 5006 (1963)

b.135-136

intervals (in semitones) →

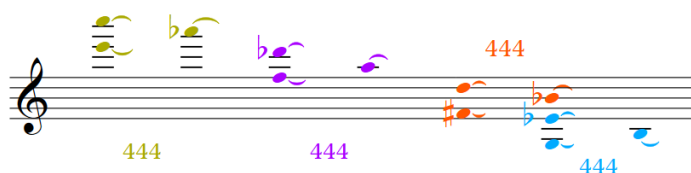
Evidently, both chords feature all four augmented triads, cover all twelve pitch-classes, and occupy essentially the same register. But temporally and grammatically, there are obvious differences in how these chords are treated. The chord from *Zima* quoted above is one of seven strikingly similar sonorities providing the entire harmonic material for the orchestral or piano accompaniment. Since the seven are mostly comprised of the same two intervals, the effect is uniform. In *Madame de Meuron*, however, **TM6** is presented alongside intervallically contrasting

sonorities, generating a thoroughly heterogeneous harmonic dialogue. This reflects more general trends. Whilst my approach to spacing large chords *in isolation* owes a substantial debt to Lutosławski and stands in stark contrast to – for example – certain chords in Carter,¹⁷³ *in a temporal context* the reverse is true: my concern here is for a neo-Zarlinian or Carterian harmonic *varietà*,¹⁷⁴ rather than Lutosławskian homogeneity (*Zima*), or relative homogeneity (elsewhere).

The seven very similar chord-aggregates from *Zima* are listed in Rae ([1994] 1999).¹⁷⁵ Rae discusses these purely in interval-class terms, without reference to roots or grammatical implications. Indeed, Rae's general view of Lutosławski's mature harmonic practice is that whilst chords such as that quoted above amount to 'polychords',¹⁷⁶ such sonorities are 'divorced from any tonal context',¹⁷⁷ and 'should not be taken as implying tonal functions'.¹⁷⁸ However, I contend that Rae's wording paints a misleading picture of how the *Zima* polychords, for example, are actually perceived. The distance between Lutosławski's approach and diatonic tonality is not nearly as great as Rae implies, as the following brief analysis demonstrates.

The sonority quoted above unfolds through a fairly slow, arpeggiated gesture. Considering, for the time being, only the piano version of 1957, Rae's reasoning would have us hear it simply as a stack of intervals – four superimposed augmented triads:

Lutosławski, Witold: *Zima* from *Five Songs for Female Voice and Piano* [1957]
Celle: Moeck Verlag - no. 5006 (1963)
b.135-136: interval-class sets (selective)



¹⁷³ I am thinking above all of Carter's use of chords containing not only all 12 pitch-classes but also all 11 intervals smaller than an octave. See Schiff, David: *The Music of Elliott Carter*, London: Eulenberg ([1983] 1998), pp.36 and 41. The two 12-note chords from Carter's *Piano Concerto* (1965) discussed on pp.26-27 of this paper are not of this type. We shall re-examine the first of these chords shortly.

¹⁷⁴ See this paper, pp.1-2.

¹⁷⁵ Rae, Charles Bodman: *The Music of Lutosławski*, London: Faber, ([1994] 1999), p.59.

¹⁷⁶ *Ibid.*, p.49.

¹⁷⁷ *Ibid.*, p.54.

¹⁷⁸ *Ibid.*, p.54.

Of course, the intervallic consistency is readily audible, and highly satisfying. But in practice, bearing in mind the rate of decay on the piano, we cannot help but *also* hear a succession of first-inversion major triads.¹⁷⁹ Furthermore, in the process, we hear two perfect cadences. Surely, these can only ‘be taken as implying tonal functions’:

Lutosławski, Witold: *Zima* from *Five Songs for Female Voice and Piano* [1957]
Celle: Moeck Verlag - no. 5006 (1963)

b.135-136: chordal roots

Vocal part: green

C M D♭ M D M E♭ Mm

Considered purely as harmony, the orchestral version of 1958 produces a different effect – one more directly comparable with my own harmonic practice. The reason is simply that, when transferred to the strings, the pitches do not decay as they do on the piano. We therefore hear the polychord more fully. Consequently, we no longer directly hear the V-I cadences in the manner shown above. We do, however, still hear chordal roots.¹⁸⁰ The more straightforward of these are shown below:

Lutosławski, Witold: *Zima* from *Five Songs for Female Voice and Orchestra* [1958]

b.135-136: chordal roots (selective)

Primary roots: red
New pitches (where not primary roots): green
Other pitches possessing strong Klangverwandtschaft with primary roots: blue

C M D♭ Mm $\frac{9}{7\#}$ D Mm $\frac{9}{7\#}$ E♭ Mm $\frac{9}{7\#}$

Lutosławskian polychords might not always, or even typically possess ‘tonal functions’ such as the perfect cadences from the piano version of *Zima* illustrated above. But where the roots of such polychords are sufficiently audible, grammatical implications nonetheless ensue. In discussing chords

¹⁷⁹ Lutosławski, Witold: *Five Songs for Female Voice and Piano* [1957], online video (18.2.2013): <<https://www.youtube.com/watch?v=ihUPeb6KKIM>>, 4:43-4:51.

¹⁸⁰ Lutosławski, Witold: *Zima* from *Five Songs for Female Voice and Orchestra* [1958], online audio (25.9.2013): <<https://www.youtube.com/watch?v=9GqZROtdlq4>>, 0:40-0:48.

of this type, Stucky ([1981] 2009),¹⁸¹ unlike Rae, tentatively begins to explore this aspect, briefly alluding to tension and stability.¹⁸² But again, Stucky's primary focus remains on interval-classes. Both authors observe that by restricting the number of these, Lutosławski allows dense, pitch-class rich chords of this kind to gain much-needed clarity. My contention is that whilst this is a helpful attribute in that regard, it will not *in itself* suffice to render such a chord harmonically intelligible. We may ascertain this by revisiting chord *j* from Carter's *Piano Concerto* (1965):

Carter, Elliott: *Piano Concerto* [1965]
New York and London: Associated Music Publishers - AMP 6735 (1991).

j. p.135, b.494.

The image shows a musical score for a 12-note chord. The score is written for piano and consists of three staves: a treble staff, a middle staff, and a bass staff. The chord is labeled 'j.' and is located on page 135, measure 494. The intervals between the notes are listed on the right side of the score, grouped by staff. The intervals are: 6, 4, 3, 6, 4, 6, 4, 6, 13, 4, 6. The intervals are listed in a column on the right, with arrows pointing to the corresponding notes in the score. The intervals are: 6, 4, 3, 6, 4, 6, 4, 6, 13, 4, 6. The intervals are listed in a column on the right, with arrows pointing to the corresponding notes in the score. The intervals are: 6, 4, 3, 6, 4, 6, 4, 6, 13, 4, 6.

intervals (in semitones)

In this instance, Carter constructs most of the 12-note chord out of only two intervals, as Lutosławski so often does. The crucial difference is that in the *Zima* chord, the roots and *Klangverwandtschaften* are also aurally clear, whereas in chord *j*, as we have seen, they are not.¹⁸³ It is this quality of *affinity* that often allows large chords in Lutosławski to serve not merely as *objets sonores* or signposts, but manifestly take on coherent grammatical roles within their harmonic contexts, well above and beyond those suggested in passing by Stucky.

The same is true of all **TM** chords in *Madame de Meuron* – albeit these grammatical implications are exploited very differently in my music, as will gradually become apparent over this, and subsequent chapters. Despite the strong resemblance between **TM6** and the 12-note *Zima* chord discussed above, the 12 pitches of **TM6** are deployed far more rapidly than in the Lutosławski

¹⁸¹ Stucky, Steven: *Lutosławski and his Music*, New York: Cambridge University Press, ([1981] 2009), pp.116-123.

¹⁸² *Ibid.*, p.118.

¹⁸³ See this paper, pp.26-27.

example. The same applies to the various chordal roots. We can begin by considering **TM6** as an aggregate of 12 major and minor triads, with 6 chordal roots – B, Eb, Ab, C, F and A:

Chord **TM6**
p.28, b.216

The image shows the musical notation for Chord TM6, consisting of two staves. An arrow points from this notation to a separate staff titled 'Roots of full sonority, in isolation:'. This staff displays six triads, each with a root label below it: B Mm (red), Eb Mm (purple), Ab Mm (pink), C Mm (pink), F Mm (pink), and A Mm (blue). The notes are color-coded to match their respective roots.

In practice, even taking the full aggregate in isolation, although traces of all 6 roots are arguably audible, some roots outweigh others, due to register. B, Eb and A are more prominent; Ab, C and F less so. But the interlocking presentation brings in two further roots – Db (orange) and D (green):

Chord **TM6**
p.28, b.216

This image shows the musical notation for Chord TM6 with additional annotations. A dashed line separates the initial chord from a section titled 'Cadential resolution roots:'. This section shows the progression of roots: B (red), D (green), Eb (purple), and A (blue). Arrows indicate the movement between these roots. A note labeled 'Db M' (orange) is shown above the B root, with an arrow pointing to it from the text '*Once the remaining 6 pitches are added, the high Db is no longer heard as a root.' The final chord is labeled 'A Mm' (blue) with a 7# and 6b annotation.

To my ears, in practice, the four 'cadential resolution roots' identified above – B, D, Eb and A – are the strongest elements in the twelve-note sonority. Within that aggregate, the Ab, C and F elements provide some background colour, but no more than that (see the previous example above, in pink). Within the *first* interlocking element, only one of the 4 'cadential resolution roots' is heard: B. The Db major element initially anchors the high register, but since it is never reinforced by a 5th, once the second interlocking hexachord is introduced, the Db is engulfed by the other roots.

In the high register, the effect is thus of a cadence: Db major (orange) to A major (blue) – a quasi-Riemannian mediant shift. But the low register can also be heard cadentially. One can hear the B root (red) progressing to Eb major/minor (purple). Alternatively, and simultaneously, one can hear

the same B root moving to a D major 9th (green). In addition, again simultaneously, one can hear the B root simply retained and reinforced – filled out into a major/minor sonority. The progression of roots can thus be heard in any or all of four ways – three cadential and one non-cadential. In practice, surely no listener can be directly conscious of each concurrent progression of roots, in real time. But that does not render the phenomenon aurally ineffective. I submit that in grammatical terms, any well-trained musical ear can distinctly hear each of the four root-progressions set out below. An untrained musical ear will hopefully also sense an undefinable but satisfying logic to the simultaneous strands of polycadences such as this. The secret, as ever, lies in the spacing – in this case, the combination of a Lutosławskian restriction of intervals, careful handling of *affinities*, and an interlocking device which, even as it adds further complexity, paradoxically enhances aural clarity:

The image displays a musical example of a polycadence, showing a sequence of chords that can be interpreted in four different harmonic contexts simultaneously. The notation includes a treble and bass staff with various chord voicings and accidentals. Labels above the notes indicate the root and quality of the chords: D♭ M 7[#] (orange), A (blue), B (red), and D (green). Below the main notation, four staves illustrate the progression from different harmonic perspectives, each with a box containing the key signature and the progression of Roman numerals.

- In A major/ minor:** III(♯) 7[#] - I 6^b
- In E♭ major/ minor:** VI(b) - I 6^b
- In D major:** VI - I 9
- In B major/ minor:** I - I 7[#]

TM6 is the most formidable sonority of this short passage, possessing the greatest number of pitch-classes and roots. Its arresting quality justifies its position at the start of the section, to maximise its impact on the listener. By comparison, **TM5** is straightforward. It is essentially a stack of 4^{ths}, with the lowest 3 pitches (A, D, G) up an octave. One could hear the 8 pitch-classes as bound, pandiatonically and non-cadentially, to just one root – F – or else Bb. Alternatively and concurrently, two cadential resolutions are audible – to D minor in the low register, and Eb major in the high register:

Chord **TM5**
p.28, b.216

Cadential resolution roots: $Bb^{\frac{1}{9}} M^{\frac{1}{6}}$ $Eb^{\frac{1}{9}} M^{\frac{1}{6}}$

F $Mm^{\frac{1}{9}} \frac{7}{6}$ D $m^{\frac{1}{9}} \frac{7}{6}$

pandiatonic (Mm or $7b/7\#$)

1 2 3 4 5 6 7
5 6 7 1 2 3 4

In Eb major: $IV^7 - I$

In Bb major: $I^9 - I^9$

In F major: $I - I^{\frac{9}{6}}$

In D minor: $III - I^7$

TM6 is appreciably tenser, denser, more complex and more sensorily dissonant than **TM5**. In **TM6**, the roots clash; they lock horns. In **TM5**, by contrast, the roots reinforce one another through a single unifying stack of 4^{ths}. Thus, a great deal of the initial tension of **TM6** is, if not entirely resolved,

at least relieved. We proceed from a pronounced, icily tense *tendance*¹⁸⁴ to a substantially less charged *tendance*, but not a *repos* altogether. In this case, the length of **TM5** allows the listener to savour the release of pressure, whilst anticipating further movement.¹⁸⁵

The following sonority, **TM7**, closely resembles **TM5**, and thus need not detain us. The next link in the chain, however – **TM4** – provides a different angle, combining the relative transparency of **TM5** with a more intricate interaction between roots. Taken as a single 8-note chord-multiplication and polychord, the strongest root is clearly D#/Eb, followed by D, its mirror image in the higher register:

Chord **TM4**
p.28, b.219

intervals (in semitones)

The diagram shows a musical staff with two staves. The top staff has a treble clef and the bottom staff has a bass clef. The notes are: G4, A4, B4, C5 on the top staff and F#3, G3, A3, B3 on the bottom staff. To the right of the staves, a bracket groups the intervals between the notes: 6, 3, 2, 6, 3, 2, 6. An arrow points from the text 'intervals (in semitones)' to this bracket.

But the interlocking presentation allows no fewer than 6 of the 8 pitches to be heard as roots:

Chord **TM4**
p.28, b.219

*Once the remaining 4 pitches are added, the high B nor the F# can also still perhaps be heard as roots, albeit less strongly.

Main roots (final sonority only):

The diagram shows a musical staff with two staves. The notes are: G4, A4, B4, C5 on the top staff and F#3, G3, A3, B3 on the bottom staff. Below the staff, several root interpretations are shown with colored dots and labels: Bm* (purple), F (pink), D M (blue), Cm¹¹ (green), F#* (orange), Eb M⁹₆ (red), Eb Mm⁹₆ (red), Cm¹¹_{7#} (green), F (pink), and D Mm⁷₆ (blue). Arrows connect these roots to the notes on the staff. A plus sign is between F#* and Eb M⁹₆. A dashed line connects Bm* and F. A dashed line connects D M and Cm¹¹. A dashed line connects Eb Mm⁹₆ and F. A dashed line connects Cm¹¹_{7#} and D Mm⁷₆. The text 'Main roots (final sonority only):' is above the staff.

That is, **TM4** can perhaps be heard in up to six different ways, with three cadences and three held roots. The cadences occupy the foreground, on the whole. Strongest among these is a III – I cadence

¹⁸⁴ It should be recalled that '*tendance*' signifies 'tendency' and not 'tension'. See this paper, p.24.

¹⁸⁵ See the transcription of b.216-221 on p.60 of this paper.

in Eb major/minor in the lower register. The next most prominent is a IV – I cadence in F Lydian in the upper register. A resolution to C minor is also perceptible in the middle register. Furthermore, the three roots in the first interlocking component arguably remain audible as such within the ensuing 8-note chord, albeit to varying degrees. That is, whilst the D root is reinforced, the B minor and F# elements recede somewhat, without – to my ears – disappearing altogether:

The diagram illustrates the construction and modal interpretations of Chord TM4. On the left, Chord TM4 is shown as a single 8-note chord in G major (p.28, b.219). It is then broken down into two components: a B minor triad (Bm) and a D major triad (DM), or alternatively, an F# major triad (F#M) and an Eb major triad (EbM). These components are then mapped to various modes across seven staves on the right:

- In F Lydian:** IV - I (Upper register)
- In C minor:** II - I (Middle register)
- In Eb major/minor:** III(b) - I⁷ (Lower register)
- In B minor:** I (Lower register)
- In D major:** I - I⁷ (Lower register)
- In F#:** I (Lower register)

Color-coded notes and accidentals are used throughout to show the correspondence between the chord's components and the modal interpretations.

Despite the various nuances identified above, the power of the cadential resolution to Eb in the lower register is sufficient to anchor the sonority securely: the eight-note aggregate is relatively stable. The intervallic mirror-image higher up (6-3-2-6) also brings about a certain translucence.

By contrast, the ensuing gesture – **TM8** – is essentially *unstable*. Again, the lower register is critical. In the full 9-note **TM8** aggregate, the three potential roots in the lower register work against

one another. The D major 9th is undermined by the G# a tritone below. The B minor 7th, likewise, is undermined by the same pitch. That is: in theory, one could perhaps hear the G# as an added 6th to the B sonority – but in practice, as the lowest note, the G# also stakes a claim as the root of a minor 9th chord (blue). This G# element, in turn, is undermined by the absence of the 5th, replaced by a destabilising tritone (D). Only the C major 7th in the high register locally establishes a firm footing – but due to its registral position, that is not enough for the C⁷ to neutralise the ambiguities below it:

Chord **TM8**
p.28, b.220

Roots (final sonority only):

or

+

[D]⁹ C B D M⁹ B m⁷ G# m⁹ C M⁷

The uncertainty between the low B and G# roots in **TM8** parallels a standard Baroque-style $\frac{6}{5}$ *double emploi*.¹⁸⁶ In F# major, the chord G#-B-D#-F# can be heard either as chord IV (root: B) with an added 6th, or chord II⁷ (root: G#). Some spacings of the $\frac{6}{5}$ resolve the issue definitively one way or the other; others leave it open. In the latter case, there are genuinely two roots: the chord may be heard grammatically in either of two ways. The Baroque $\frac{6}{5}$ chord constitutes a clear precedent, in that respect, to most of the sonorities examined in Chapters 5 and 6 of this paper. That is: in the much wider context of the 4,096, chordal spacing permitting, the vast majority of *sets of pitch-classes* can likewise be made to take on *double emplois*, *triple emplois*, *quadruple emplois* and so on.

Returning to the passage in question from *Madame de Meuron*: in response to **TM8**, **TM3** re-stabilises quickly and efficiently. There are two neat, simultaneous cadential resolutions: a perfect cadence in B major in the low register, and a plagal cadence in C major in the high register. B major anchors the aggregate sonority; it is unquestionably the stronger element. As before, the *tendance* roots of the first interlocking component – F# and F – are dispatched to the background as the

¹⁸⁶ See Dahlhaus, Carl: op.cit. ([1966] 1990), pp.24-25.

second component sounds. Since the B major anchor is in the 1st inversion, the full **TM3** sonority does not amount to a full *repos*, but certainly a great deal of *tendance* energy is resolved. Of the chain of polycadences analysed here, **TM3** is the most decisive in its effect:

Chord TM3
p.28, b.220

Roots: 8^{va}

or +

F M^{7#}
F# m^{7#}

C⁹
B Mm

F# m^{7#}

B Mm^{11 9 7 6#}

F M^{9 7#}

C M^{11 9 6}

pandiatonic (Mm; 7^b)

In C major: IV⁷ - I⁹

**In B major/
minor:** V⁷ - I

The polychordal techniques demonstrated in Chapter 5 form the foundations of my *vertical* approach to harmony. This chapter has begun to explore, albeit only on a localised, chord-to-chord level, how the grammatical implications of certain polychordal sonorities can play out. We may now focus in earnest on the horizontal aspect – that is, the second half of D’Alembert’s definition below:

‘L’harmonie est proprement une suite d’accords qui *en se succédant* flattent l’organe.’
[‘Harmony is properly a series of chords that, *by their succession*, please the ear.’]¹⁸⁷

¹⁸⁷ D’Alembert, Jean le Rond: *Éléments de musique théorique et pratique suivant les principes de M.Rameau, éclaircis, développés et simplifiés*, Lyon: Jean-Marie Bruyset ([1752] 1766), pp.1-2. This sentence only: transl. Robert O. Gjerdingen, quoted in Dahlhaus, op.cit. ([1966] 1990), p.22.

This requires some consideration of serialism: a large part of my approach to harmonic *succession* depends on certain serial strategies. Some of these have evolved from tried-and-tested models developed by other composers; others are more idiosyncratic. Chapters 7 and 8 will examine methods through which I mould chordal progressions; Chapter 9 will deal with the melodic aspect; Chapter 10 will survey texture.

Given the strong anti-serial sentiment in some contemporary music circles, I must stress that in employing such techniques, at all times, my ultimate aim is: ‘flatter l’organe.’ I contend that those present-day composers who consider such an objective to be incompatible with serialism are very much mistaken. The following four chapters will hopefully succeed in demonstrating why.

7. Chordal Cycles

'The best music arises from an alliance of a compositional grammar with the listening grammar.'¹⁸⁸

This chapter focuses on a single serial technique that I have found invaluable in helping to generate satisfying successions of chordal sonorities. If applied flexibly and sensitively, in conjunction with the approach to spacing outlined in Chapters 5 and 6, the technique generates true harmonic momentum, prompting and playing with the listener's subconscious harmonic expectations on a chord-to-chord level, at every turn. Various forms of this technique feature in all of my recent scores, to a greater or lesser extent. It plays an especially important role in *Madame de Meuron* and *The Art of Thinking Clearly*. In purely mathematical terms, there is a debt to a serial device first employed by Alban Berg. In *musical* terms, however, the results bear little, if any meaningful relation to Berg's original device.

One of the main criticisms levelled at serialism has been of the 'huge gap... between compositional system and cognized result.'¹⁸⁹ Considered in isolation, Berg's use of sieving to derive various 12-note rows from one another in *Lulu* (1935) would appear to represent a prime example. For instance, *a priori*, the practice of taking every seventh pitch-class from the 'Lulu' row to create the 'Alwa' row¹⁹⁰ would surely not be aurally apparent to the listener – or so it would seem. And yet, hypothetically:

♩ = 108 'Lulu' series

'Alwa' series
(every seventh note from 'Lulu' series)

1 2 3 4 5 6 7 8 9 10 11 12

ff *mf*

1 8 3 10 5 12 7 2 9 4 11 6

ff *mf*

¹⁸⁸ Lerdahl, Fred: 'Cognitive Constraints on Compositional Systems' [1988] in *Contemporary Music Review*, vol.6, n°2 (1992), p.119.

¹⁸⁹ Ibid., p.97.

¹⁹⁰ See Whittall, Arnold: *Serialism*, Cambridge: Cambridge University Press (2008), pp.80-82.

A posteriori, then, in other circumstances, should a composer wish to make the connection audible, there would be no great challenge. Evidently, in the hypothetical example above, very few if any listeners would work out, in real time, that the second bar extracts every seventh note from the first. But clearly, a link of some kind would be heard. That aside, in normal circumstances, the connection between the two rows, as employed in *Lulu*, is very far removed from the listener's experience, and therefore would seem effectively all but arbitrary. The same applies to other, similar forms of sieving in *Lulu* to derive the 'Schoolboy' and 'Dr Schön' rows from the 'Lulu' row.¹⁹¹

Ostensibly, these would seem extraordinarily unhelpful foundations for a method of harmonic structuring seeking to integrate successfully with 'listening grammar'. However, counterintuitive as this might seem, harmonic technique permitting, the act of sieving *sets of pitch-classes* – rather than single pitch-classes, as Berg does – to create a series of chords changes everything.

The treatment of row **A3** in b.247-252 (pp.31-32) of *Madame de Meuron* will serve to illustrate the basic principle, and its effect on the listener. In the hypothetical retrograde 'Alwa' version of the **A3** row given below, there is no discernible aural connection between C# and E: the fact that these were formerly elements 1 and 2 respectively of the original row is irrelevant to the listener. Likewise, in the 'Alwa' version, C and B – formerly elements 6 and 7 of **A3** – are not audibly related:

A3

1 2 3 4 5 6 7 8 9 X E T

Retrograde 'Alwa' version of **A3** (never sounded)

1 6 E 4 9 2 7 T 5 X 3 8

However, if '1' signifies not C#, but a chord comprising elements 1-5 from **A3** [C#, D#, E, F, Bb]; if '2' signifies elements 2-6 [D#, E, F, Bb, C]; if '3' signifies elements 3-7, etc., then audible correlations

¹⁹¹ Summarised *ibid.*, pp.80-82.

start to materialise. As shown below, Pentachord 1 (red) shares four pitch-classes with Pentachord 2 (pink). Pentachord 6 (light blue) shares four pitch-classes with Pentachord 7 (blue-green). As isolated harmonic colours, the similarities within both pairs of *sets of pitch-classes*, presented in this fashion, are immediately apparent to the ear:

Retrograde 'Alwa' version of A3 (never sounded)

Thus, if we hear all twelve pentachords in retrograde 'Alwa' order, upon hearing the second box above [23456, 789XE], consciously or otherwise, we sense a near-echo of the first box [12345, 6789X]. There is a substantial element of repetition and a small element of change. This is merely one of many such modified reflections. For example, the first five pentachords (1, 6, E, 4, 9) are mirrored by the next five: (2, 7, T, 5, X). That is, the latter group follow a very similar harmonic course, with just one pitch-class altered between each corresponding pair of pentachords. Moreover, the succession 1, 6, E, 4, 9 is *also* mirrored by the succession T, 5, X, 3, 8 – again, with just one pitch-class changing each time. Thus, each pentachord in the series *simultaneously* mirrors two other, very similar pentachords, prefiguring or recalling not only their content, but also their context. There are further audible connections still, to be explored in due course. My term for this type of chordal sieving, in which any given portion of a chord progression reflects one or more other portions with a small degree of modification, is 'Hall of Mirrors'. 'Alwa' is one of many sieving patterns that can viably be exploited to this end.

However, in practice, the element of chordal spacing adds further complexity. One must mitigate sensory dissonance to the desired level, clarify roots and *affinities*, and handle the voice-leading adeptly. In my harmonic approach, these are all priorities. Consequently, whilst Pentachords 6 (light blue) and 7 (blue-green) given *above* share four pitch-classes, in practice, even when sounded in isolation, the audible relations between the corresponding two chords given *below* are very subtle. For example, the root of the light blue chord, C, happens to be the only pitch-class not carried over to the blue-green chord: a significant change of focus. Whilst the three high-register pitch-classes are identical, voice-leading considerations dictate that they cannot be spaced in the same manner:

Madame de Meuron

'Alwa' Pentachordal Hall of Mirrors Cycle: pp.31-32, b.247-252

A3 row: 1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

NB: 1* = 1, 2, 3, 4, 5
 6* = 6, 7, 8, 9, 10
 etc.

By considering the other *numerically* obvious mirror to Pentachords 1 and 6 identified above, we can hear another angle:

A3 row: 1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

Taking the pairs of chords in isolation, in this instance, the audible connections are a little stronger. Both light and dark blue chords feature the same high G#. Both red and orange chords lead up to the G# from the same D#/Eb. However, once again, despite the various correspondences between pitch-classes, the spacing highlights different roots and *affinities*. Furthermore, the respective rhythmic profiles work against the D#-G# melodic shape.

But we have not yet viewed all possible angles – in serial terms at least – from which Pentachords 1 and 6 are reflected:

A3 row: 1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

There are three shared pitch-classes between Pentachords 1 and 11, three between 6 and 4, and three between 11 and 9: another, albeit fainter, hidden harmonic mirror. Although there are slightly fewer pitch-class correlations, the temporal proximity of the chords makes up for the shortfall. And in this case (b.247-249), the rhythmic and melodic shapes evidently work with the grain of the ‘Alwa’ pattern: here, hidden correspondences are reinforced. But as listeners, we are only directly conscious of the gestures, and not of the pitch-class links.

A little later, with Pentachords 3 and 8, where the same rhythmic gesture returns, the harmonic echo on this occasion is – in isolation – obvious:

A3 row: 1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

Of the multitude of harmonic correlations in this chord progression, few are directly discernible in real time, and only then to the keenest of ears, typically – as with Pentachords 3 and 8 above – where the highest and/or lowest voices repeat pitches previously sounded. And yet the effect is curiously coherent and gratifying. Over these six bars, effectively, the same 12-note row is simply repeated, with no transpositions, five times over. The harmony flows consistently in the same direction, without interruption. We simply catch it from a different angle with each new chord. Accordingly, whilst we can never quite predict the next sonority at any given point, as it arrives, it feels somehow like a logical consequence of what has gone before. That is, it feels right.

The 12-chord Hall of Mirrors ‘Alwa’ cycle discussed above is one of an unbroken string of three, featuring similar spacings, rhythmic and melodic gestures and instrumentation.¹⁹²

Madame de Meuron

'Alwa' Pentachordal and Hexachordal Hall of Mirrors Cycles: pp.31-33, b.247-261

A3

1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

A3 Inversion

1* 6* 11* 4* 9* 2* 7* 12* 5* 10* 3* 8*

¹⁹² There is of course another textural element running in counterpoint throughout. For the sake of clarity, we are ignoring textural combinations of this type until Chapter 10.

A

259 etc.

NB: $1*6 = 1, 2, 3, 4, 5, 6$
 $6*11 = 6, 7, 8, 9, 10, 11$
 etc.

1*6 6*11 11*4 4*9 9*2 2*7

This thread extends, with the same fast rate of harmonic change, for 47 chords (lengthened from 36 via short repeats at the end of the **A** cycle). From a technical angle, successful handling of the joins between cycles is essential, if harmonic continuity and momentum are to be maintained. A key factor in the first link between cycles is that the last chord of the **A3** chain (Pentachord 8, green, b.252) shares four pitch-classes with the corresponding chord in the following chain (b.258). These are given below in green:

A3

1 2 3 4 5 6 7 8 9 10 11 12

A3 inversion

1 2 3 4 5 6 7 8 9 10 11 12

Therefore, bar 252 effectively belongs to both cycles. There is no break in the harmonic grammar; merely a change of direction. Moreover, the second cycle (b.253-258) naturally possesses a similar general harmonic flavour, since its *sets of pitch-classes* simply invert the first cycle.

The next join between 'Alwa' cycles is smoothed over in a similar fashion. The first chord of the **A** cycle (b.259) is made up of the same 6 pitch-classes that would have occurred had the **A3** cycle simply resumed, via a reversal of the green-to-green shift explained above, and switched to hexachords (compare blue and red elements, above and below):

A

1 2 3 4 5 6 7 8 9 10 11 12

This simply amounts to another subtle change of harmonic direction. At no point in the chain of 47 chords is there a sudden, ungrammatical jolt: we hear these sonorities in a continuous, unbroken, pleasingly logical progression. Or at least, that is the intention.

The passage from *The Art of Thinking Clearly* entitled 'Drawing the Bull's Eye Around the Arrow' (pp.28-30, b.384-409) illustrates an alternative application of the Hall of Mirrors principle. A different sieving technique is employed, skipping alternately two and three pitches from a generative 12-note series, to produce a serial cycle of 24 chords (in this instance extended to 31 via short repeats at the end of the cycle). In serial terms, the material is trichordal, but in aural terms, a sustained B pedal turns most sonorities into tetrachords:

The Art of Thinking Clearly

Trichordal Hall of Mirrors Cycle: p.28-30, b.386-408

The musical score illustrates a Trichordal Hall of Mirrors Cycle, consisting of 31 chords arranged in three staves. The chords are labeled with Roman numerals and figured bass notation, and are connected by colored lines indicating relationships.

Staff 1:

- 123: B M⁹ (I^{inv.})
- 456: D⁶ B m⁷ B^b M^{7#}
- 89X: E m^{9b} (IV)
- ET1: F#^{11#} B⁹ (V^{I inv.})
- 345: B Mm⁷ (I⁶)
- 678: E M^{11#} (IV⁶)
- XET: F B (IV⁺ I)
- 123: B M⁹ (I^{inv.})

Staff 2:

- 567: G# m^{9b} B^b 7 B⁷ (IV)
- 89X: E m^{9b}
- T12: B⁹ C#^{7#}
- 345: B Mm⁷ (I⁶)
- 789: E Mm (IV⁶)
- XET: F B (IV⁺ I)
- 234: B Mm (I⁶)
- 567: G# m^{9b} B^b 7 B⁷

Staff 3:

- 9XE: F⁹ G M^{7#} B (IV⁶)
- T12: B⁹ C#^{7#}
- 456: D⁶ B m⁷ B^b M^{7#}
- 789: E Mm (IV⁶)
- ET1: F#^{11#} B⁹ (V^{I inv.})
- 234: B Mm (I⁶)
- 678: E M^{11#} (IV⁶)
- 9XE: F⁹ G M^{7#} B (IV⁶)
- 123: B M⁹ (I^{inv.})
- 456: D⁶ B m⁷ B^b M^{7#}
- 89X: E m^{9b} (IV)
- 789: E Mm (IV⁶)
- ET1: F#^{11#} B⁹ (V^{I inv.})

Here, the harmonic gravitation can be heard far more directly. This is partly due to the relative sparseness: there are only three *mobile* voices, as opposed to five and six in the previous example. The other obvious factor is the stabilising role of the pedal B, which is in effect a quasi-tonic. But whilst B serves as a root for many chords, none of these are presented in root position. Thus, every chord is a *tendance*, seeking a resolution that never quite materialises. Only the very first chord, repeated at the end of the first line above, feels like a partial *repos* – enough to help establish B as a gravitational centre, but not enough for a full resolution. Every chord in this passage can be heard quasi-*functionally* in relation to B. For example, 89X (first line, green) is a quasi-subdominant. The next chord possesses two roots, the stronger of which (F#) is a quasi-dominant. Certain chordal roots that do not belong to B major or minor can nonetheless be heard in some other scalar relationship to B: the F root in XET (brown) feels like a sharpened 4th or flattened 5th – a kind of Chord IV½. Even the relatively ambiguous sonorities beginning with 567 at the end of the second line gravitate inexorably back to B; the progression 789 – ET1 – 234 in the third line is effectively a IV-V-I⁶ cadential formula.

As before, this Hall of Mirrors cycle builds up the listener's harmonic expectations by retracing the same ground repeatedly, only from a different angle on each occasion. In this passage, whenever a *set of pitch-classes* recurs, the spacing is identical, reinforcing the aural connections. (From a technical angle, in this context, voice-leading matters were sufficiently straightforward to allow this.) The second occurrence of any chord proceeds almost to the same *set of pitch-classes* as before, with one change (compare the various continuations from the green, pink and brown chords above). Subconsciously, at every turn, we expect something like the chord that follows, but there is always a slight twist – enough to keep the progression fresh and compelling.

This type of serial sieving cycle naturally falls into three phrases of eight chords, each beginning and ending with the same sonority – i.e. the first, second and third lines respectively. In isolation, the recurrence of the opening *set of pitch-classes* can allow a natural 8-chord phrase shape to emerge. However, in these specific musical circumstances, the effect of three such self-contained phrases, each neatly returning to its initial chord, would have sounded wooden. Therefore, the phrasing of

the full cycle serves to break this pattern. After a formal 8-chord first phrase, the prolongation and accentuation of chord 234 (second line, pink – score, b.396) opens up a wider phrasing structure:

Phrase 1

123	456	89X	ET1	345	678	XET	123
B M ⁹	D ⁶ B m ⁷ B ^b M ^{7#}	E m ^{9b}	F ^{11#} B ⁹	B M m ⁷	E M ^{11#}	F B	B M ⁹
I ^{inv.}		IV	V ^{I^{inv.}}	I ⁶	IV ⁶	IV ⁺ I	I ^{inv.}

Phrase 2

567	89X	T12	345	789	XET	234
G [#] m ^{9b} B ^b 7 B 7	E m ^{9b}	B ⁹ C [#] 7#	B M m ⁷	E M m	F B	B M m
	IV		I ⁶	IV ⁶	IV ⁺ I	I ⁶

Phrase 3

567
G [#] m ^{9b} B ^b 7 B 7

Phrase 4

9XE	T12	456
F ⁹ G M ^{7#} B	B ⁹ C [#] 7#	D ⁶ B m ⁷ B ^b M ^{7#}

Phrase 5

789	ET1	234	678	9XE
E M m	F ^{11#} B ⁹	B M m	E M ^{11#}	F ⁹ G M ^{7#} B
IV ⁶	V ^{I^{inv.}}	I ⁶	IV ⁶	

Phrase 6

123	456	89X	789	ET1
B M ⁹	D ⁶ B m ⁷ B ^b M ^{7#}	E m ^{9b}	E M m	F ^{11#} B ⁹
I ^{inv.}		IV	IV ⁶	V ^{I^{inv.}}

If spaced in root position, 234 would have made a mediocre *repos* – a premature, stilted return to the quasi-tonic B. Instead, the first inversion, sidestepping a cadential closure onto B, charges 234 with a great deal of *tendance*. Consequently, it exerts a powerful short-term structural influence – twice keeping the expected resolution to B at bay, and in the process exuding a harmonic energy that binds Phrases 2 to 6 together and overrides the 8-chord divisions. The potency of 234 is further enhanced by its distinctive spacing, allowing it to serve as a signpost, consciously modelled on another signpost chord from the opening bars of Poulenc's *Dialogues des Carmélites* (1956).¹⁹³ Both chords feature a bell-like minor 3rd, omit the 5th, double the root and lie in the same register:

¹⁹³ Poulenc, Francis: *Dialogues des Carmélites* [1956], online video (7.3.2014): https://www.youtube.com/watch?v=Blm5mLj_ma8, 0:00-0:20.

The Art of Thinking Clearly

b.396

Poulenc, Francis: *Dialogues des Carmélites* [1956] - vocal score
Milan: Ricordi - R.1471 (1957).

Act I, Scene 1
p.1, b.1-6, 8-9, 12-13.

Cycles such as this one do not simply operate on a local level: there are longer-term structural implications. In this case, the entire passage is a harmonic echo of an earlier section – ‘Why You See Shapes in the Clouds’ (pp.4-8, b.51-86). The same Hall of Mirrors cycle is applied to the same row, untransposed. Serially, the two pathways are identical, except that in the initial version, two pitch-classes are added to each set. The following harmonic summary covers only the beginning of the earlier cycle:

The Art of Thinking Clearly

Pentachordal Hall of Mirrors Cycle: pp.4-6, b.51-65

12345 45678 89XET ET123 34567 6789X XET12 12345

B Mm $\frac{9}{7}$ E M $\frac{11}{7}$ C M $\frac{11}{11}$ B M $\frac{9}{9b}$ Eb $\frac{11}{7}$ F m $\frac{10}{7\sharp}$ C# M $\frac{11}{7\sharp}$ B Mm $\frac{9}{7}$

in B: I - IV^{inv.} - I^{inv.} - (I) - I

56789 89XET T1234 34567 789XE XET12 23456 56789

A⁷ C M $\frac{11}{11}$ C m⁹ B Mm⁹ D^{9b} [Ab/F#E] B⁹ B Mm^{7\sharp} A⁷ Ab⁷ C M C m⁹ B Mm⁹ D^{9b} [Ab/F#E] B⁹ B Mm^{7\sharp} A⁷ Ab⁷ F D⁶ Ab⁷

aggregate of:
a. chord multiplication of elements 5,6,7,8,9
b. inversion of that chord multiplication

In practice, since the full chord sounds for only a semiquaver, at best, one can only perceive the faintest trace of the 3 hypothetical roots.



There are several obvious textural, rhythmic and gestural differences. The initial passage is pentachordal, with occasional chord-multiplication flourishes. On hearing the trichordal reflection towards the end of the piece, listeners will not be directly aware of the extent of the harmonic parallels. But any listener will sense, consciously or otherwise, that B exerts a powerful gravitational pull in both passages. Other strong correspondences in the general direction of harmonic travel will also be felt, on some level. However, in the pentachordal version, since there is no pedal B, the progression of chordal roots eventually leads to a different *repos* – F (see the last chord above – 9XET1). The effect is of a quasi-modulation (see the score, pp.7-8, b.79-86): by this point, the F root is heard not as Chord IV½ of B, but as a new quasi-tonic in its own right. Up to a point, this aspect of the work's harmonic structure recalls the Exposition and Recapitulation sections of late 18th-century Sonata Form: movement from B to F in the first instance; consistent anchoring to B in the second.

One of the effects of the extra two pitch-classes per chord is to bind successive sonorities together: each sonority from 45678 onwards shares a total of three pitch-classes with adjacent sonorities (see elements in bold above: 123**45**, **45678**, **89XET**, etc.). The bonds are especially strong where *itches* are carried over (see dotted ties above). In places, these harmonic links extend to the chordal roots (see red arrows). In the later trichordal cycle, the sole pitch-class link between adjacent chords is provided by the pedal B – securing a different kind of harmonic bond, with several instances of successive chords sharing a B root (primary or secondary). Accordingly, in both of these passages, the harmonic pace is substantially more relaxed than that of the passage from *Madame de Meuron* considered earlier, where for the first two 'Alwa' cycles, no two adjacent chords share a single pitch-class.

The following excerpt includes more complex sonorities than those considered hitherto in this chapter, notwithstanding a single 14-note aggregate in the previous example. Bars 111-114 (p.9) of

*Nevermore*¹⁹⁴ consist largely of a group of chord multiplication sonorities built from hexachords, strung together via a modified 'Alwa' cycle. I consider this short passage to call into question, along with many others in my own compositions, the commonly-held view among many contemporary composers that 'the stranger and more complex a sonority or harmony becomes, the longer the ear needs to hear it properly.'¹⁹⁵

Nevermore

'Alwa' Hall of Mirrors Cycle - Hexachord multiplications: p.9, b.111-114

NB: diamond heads denote pitches added to the original hexachords via chord multiplication.
x-heads (3rd staff) denote pitches omitted from the chord multiplications.

In composing this passage, my first consideration was the spacing of each sonority, which must be aurally coherent in its own right if it is to take on any meaningful role within a grammatical structure. The vertical stacks of numbers above demonstrate the workings of the chord multiplications. Evidently, the purpose of a chord multiplication is to expand the existing intervallic identity of the original cell. To apply the process with no adjustments whatsoever would tend to create excessive muddiness in the bass register, obscuring potential roots in the process. I employ two simple

¹⁹⁴ *Nevermore* – audio file, 3:33-3:40.

¹⁹⁵ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: *George Benjamin*, transl. Julian Anderson and Michael Durnin, London: Faber and Faber (1997), p.21. See also this paper, pp.18-19.

solutions here. In 10^*3 , 3^*8 and 1^*6 , the lowest or second-lowest pitches are moved down an octave. In the first two cases, the resultant major 9^{ths} provide a solid acoustic anchor. In 7^*12 and 1^*6 , I omit certain pitches from the chord multiplication to create open major triads – again forming a firm acoustic anchor. Clarity in the bass register is a necessary precondition for any coherent harmonic progression, regardless of pace.

Other spacing problems arise in the high register. Consequently, I add only as many pitches as I can, without compromising euphony or coherence – some above the hexachord, some below. The result, when applied to all twelve hexachords from the generative row, varies from 4^*9 , to which no pitches are added, up to 6^*11 and 10^*3 – the only two sonorities in which the initial hexachord is fully reproduced in another register.

Thus, the range and density varies considerably among the chords – unlike any of the examples analysed up to now. This injects these four short bars – part of a slightly longer progression – with a different type of structural energy. In the process, different grammatical challenges arise. Above all, the internal spacing requirements of each sonority afford far less flexibility in the voice-leading from chord to chord. Were one to apply the ‘Alwa’ sieving pattern systematically, the succession of chords simply would not work. My solution was to join together those small sections of the ‘Alwa’ cycle that do happen to work (green, blue, orange), at the most aurally appropriate points. Thus, in terms of the serial cycle of hexachords, 7^*12 and 9^*2 are just one pitch-class away from what one might expect. Additionally, the cycle is reversed from 9^*2 onwards (orange), and two chords are omitted altogether. The succession still proceeds generally along ‘Alwa’ lines: at no point is there a sudden jolt to an unrelated area.

Granted, the voice-leading now works, and the registral movement in the bass now possesses a pleasing arch-shape. But one might legitimately ask: with such complex chords, and such convoluted manipulations, why bother with the ‘Alwa’ cycle in the first place? Why not simply use trial and error? There are several partial answers. Clearly, to some extent, aural trial and error was a factor. Beyond that, in constructing this chord progression, my hunch was that the hexachords would take

up a sufficiently large portion of the sonorities for the 'Alwa' cycle to retain some of its shape, even with added pitches. Only at the very beginning and end of the chord progression do the number of added pitches exceed three: thus, for the most part, the hexachords still provide the bulk of a given sonority. Furthermore, unlike the chord multiplication pitches, the hexachords remain in the same register. Consequently, our ears sense some degree of grammatical continuity in the mid-to-high range; the chord multiplications mostly punctuate this with less predictable splashes of added colour at the registral extremes.

The obvious exceptions to this last point are the low Bb to B in the first two chords. These notes exert a powerful harmonic influence, pulling the listener's subconscious focus away from the hexachordal 'Alwa' cycle. In conjunction with the movement of the four highest voices, the effect is almost of a $V_4^6-I_6^6$ or $II_4^7-I_6^6$ progression in Ab minor. Furthermore, the Bb-B is evidently one of many echoes of the piece's opening E-F motif.

A noteworthy feature of each of the serial Hall of Mirrors cycles discussed above is the unfailing avoidance of any scenario in which each of the 12 pitch-classes is sounded once, and only once, over any given elapse of time. Or even sounded two, three or four times. And yet my use of 12-note rows in these excerpts remains, for the most part, systematic. Uniform distributions of the total chromatic do eventually occur over each of the three 'Alwa' cycles from *Madame de Meuron* discussed earlier¹⁹⁶ – for example, over the cycle of pentachords between bars 247 and 252, each pitch-class is sounded *five* times, once the full cycle has unfolded. But in practice, even here, at no point do we find an even pan-chromatic distribution, since another textural element runs in counterpoint throughout.

One of the key objectives of the Hall of Mirrors method is to generate structural harmonic energy precisely through such imbalances on a local level. For example, over the first two chords of a hexachordal 'Alwa' cycle, of the available 12 pitch-classes, one sounds twice, ten sound once, and

¹⁹⁶ See this paper, pp.73-79.

one does not sound at all.¹⁹⁷ Similarly, over the first 8-chord phrase of a trichordal cycle of the type discussed earlier,¹⁹⁸ two pitch-classes are heard three times each, eight are heard twice each, and two are heard only once. When one adds to the mix: a) an approach to chordal spacing that seeks to establish vertical hierarchies, partly so as to exploit the grammatical implications of roots on a temporal level; and b) an approach to phrasing structure that allows strategic use of repetition or elision, the resultant harmonic energy and flow is far removed from the form of serialism that Schoenberg originally conceived, and light years away from the extreme version briefly in vogue during the 1950s, which typically sought to obliterate hierarchies altogether.

All versions of the Hall of Mirrors technique are designed to generate harmonic energy and movement. With the 'Alwa' version, the current is especially swift. Indeed, within equal temperament, in pitch-class terms, a pentachordal or hexachordal 'Alwa' chord cycle achieves almost the highest possible *sustainable* level of chord-to-chord movement.¹⁹⁹ Evidently, if a hypothetical Hexachord A is followed by Hexachord B, in which the remaining six pitch-classes are sounded, the rate of pitch-class change cannot be sustained, since on effecting the same manoeuvre to produce Hexachord C, one returns to the same *set of pitch-classes* with which one began. Whereas, as we have seen, upon changing *five* pitch-classes, the rate can be sustained, resulting in an 'Alwa' chord cycle.

Sustained up to a point, that is. In the longer term, in combination with other *dodecaphonic* serial harmony²⁰⁰, in using Hall of Mirrors cycles, one must guard against inducing in listeners what Roberto Gerhard (1969) has termed 'pitch-fatigue'.²⁰¹ I contend that 'pitch-fatigue' is greatly exacerbated if the roots of individual sonorities are not sufficiently clearly established (see Chapters

¹⁹⁷ See this paper, pp.73-74.

¹⁹⁸ See this paper, p.79. Evidently, for a true trichordal cycle, one would remove the B from each tetrachord.

¹⁹⁹ Almost: a hexachordal sieving cycle swapping alternately 6 and 5 pitch-classes might perhaps work. I have not yet attempted to compose with such a cycle.

²⁰⁰ So far, this chapter may have conveyed the impression that my serial practice is restricted to 12-note rows, but in fact this is not the case. Shorter and longer rows will feature, to some extent, in Chapters 8, 9 and 10.

²⁰¹ Gerhard, Roberto, quoted in Keller, Hans: 'Wrong Notes in Contemporary Music', in *Tempo*, n°90 (autumn 1969), p.9. Also quoted in Gilmore, Bob: op.cit. ([2014] 2015). [Online: no page breaks or numbers.]

3, 5 and 6), and/or if the short or medium-term harmonic pathway is not sufficiently lucid (see elsewhere in this chapter). I contend also that another component of 'pitch-fatigue' is *sensory dissonance* fatigue, where this aspect is not controlled adeptly through spacing (see Chapters 3, 5 and 6). But even when each of these aspects is well handled, the danger of 'pitch-fatigue' remains, albeit in a less severe form. The forward momentum generated by techniques such as the 'Alwa' Hall of Mirrors cycle cannot be used indiscriminately and thoughtlessly. Such methods must be tempered, at appropriate structural points, with other techniques designed to slow down the rate of harmonic change. One can then truly control the ebb and flow of successions of chordal sonorities. This matter forms the focus of the following chapter.

8. Harmonic Prolongation

We shall begin this section with a brief survey of relatively simple methods of harmonic prolongation in my scores, before proceeding to more sophisticated techniques. There will be far greater emphasis on the latter.

Of the simpler strategies, some have been in currency for centuries. In borrowing these methods, I do not break any new ground, except perhaps, arguably, in some of the contexts within which I employ them. One example is the aforementioned device of prolonging a phrase by repeating small portions of itself²⁰² – in the process, in some instances, delaying a *repos*. One associates the strategy with Rossini and Mozart, among others. A well-known, stock Rossinian move is to repeatedly retrace fragments of a localised melodic phrase and cadential formula, progressively shortening the fragments.²⁰³ The effect is to heighten harmonic anticipation and delay harmonic resolution, thereby generating considerable structural energy. Of course, before then, Mozart had already made extensive use of essentially the same device, as in the following example:²⁰⁴

Mozart, Wolfgang Amadeus: *Sonata III* [Sonata No.10 for Piano, K.330 [1783]] in *Nineteen Sonatas for the Piano* New York: Schirmer - Plate 11136 (1893).

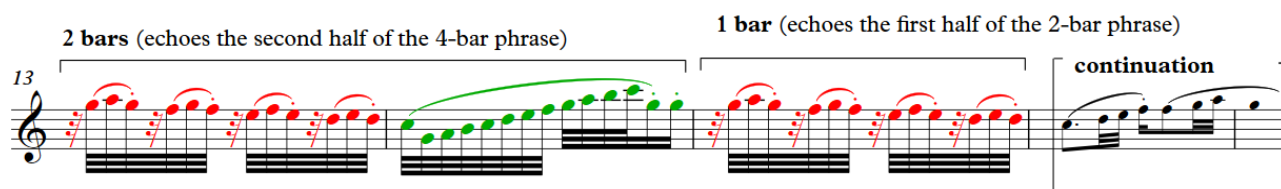
p.26 (first movement), b.1-16, right hand only

The image displays a musical score for the first movement of Mozart's Sonata No. 10, K. 330, page 26, right hand only. The score is written in 2/4 time. The first staff shows an 8-bar phrase starting with a first ending bracket. The second staff shows a 4-bar phrase that echoes the second half of the 8-bar phrase. Various melodic lines are highlighted in red, blue, and green.

²⁰² See this paper, p.78 (the 47-chord cycle), and p.79 (the 31-chord cycle).

²⁰³ See, for example, Gossett, Philip: 'The Overtures of Rossini' in *19th-Century Music*, vol.3, n°1 (July 1979), p.10.

²⁰⁴ Mozart, Wolfgang Amadeus: *Sonata n°10 for Piano in C Major*, K330 [1783], online video (22.4.2013): <<https://www.youtube.com/watch?v=-V4bGocFwnE>>, 0:00-0:35.



I occasionally employ a similar method in a serial context, on a smaller scale. A prerequisite is that the harmonic momentum within the phrase itself must already be clear – failing that, such passages would lose much of their effectiveness. Examples from my recent work include:

- *Madame de Meuron*, pp.33-35, b.259-270. Also pp.74-75, b.575-580 and elsewhere.²⁰⁵
- *The Art of Thinking Clearly*, pp.29-30, b.401-408.²⁰⁶ See b.386-387 (p.28) and b.399 (p.29).
- *Velvet Revolution*, b.277-280 (pp.44-45), b.289-291 (p.46) and b.313-320 (pp.51-52).²⁰⁷
- *Nevermore*, p.3, b.39-40, echoing b.35-37.²⁰⁸
- *Nine Dragons*, pp.23-24, b.121-131.

On a more basic level, one may hold the progress of the harmony in check by simply repeating an entire unit. In the pentachordal Hall of Mirrors cycle from *The Art of Thinking Clearly* discussed in the previous chapter,²⁰⁹ I initially withhold the third line of the cycle,²¹⁰ instead repeating the first two lines with some slight alterations. The effect of this is to delay the establishment of F as a new quasi-tonal centre. The harmony of the first line and phrase (pp.4-5, b.51-57) centres around B – already a reference point in bars 1-50. The second line and phrase (b.57-65) moves away from B, arriving at F (first chord of the third line) in bar 64. But the subsequent harmonic movement is immediately away from F and back towards B (b.66-72; third phrase; first line with alterations). We then repeat the movement away from B (b.73-80), but it is only as a result of the third line of the Hall of Mirrors cycle (b.80-86), hitherto withheld, that F is at last firmly established (b.83-86).

²⁰⁵ See also this paper, p.78.

²⁰⁶ See also this paper, p.79.

²⁰⁷ *Velvet Revolution* – audio file, 7:32-7:39, 7:57-8:03 and 8:50-9:09.

²⁰⁸ *Nevermore* – audio file, 1:10-1:26.

²⁰⁹ See this paper, pp.82-83.

²¹⁰ That is, the third line of the harmonic summary on pp.82-83, beginning with 9XET1.

Other broadly comparable cases occur elsewhere in this portfolio. The opening 43 bars (pp.1-5) of *Madame de Meuron* feature three Hall of Mirrors cycles in the woodwind, of which the second and third are repeated wholesale. The change of harmonic colour between bars 25 and 26 is rendered considerably more effective by the repetition of the second harmonic cycle (b.8-25). The same principle applies in *Velvet Revolution*, pp.47-48, b.292-302.²¹¹ Incidentally, in the first part of the same passage, the bassline also illustrates the Mozart/Rossini principle described above, in microcosm.

In each of the examples discussed so far, the harmonic material is pre-existing.²¹² One simply withholds or repeats, selectively, where appropriate, to heighten the potency and clarity of a harmonic pathway that has essentially already been conceived. Other, more elaborate techniques exist which involve the creation of new harmonic material, or the development of existing harmonic material, specifically to delay a resolution or slow down the rate of harmonic change. In my current practice, I rely above all on two such techniques. To be fully understood, these require deeper and more sustained scrutiny than those described above.

The first of these techniques is related to – but crucially distinct from – a certain adaptation of the ‘Chords of Transposed Inversion’ technique originally conceived by Messiaen. Besides Messiaen, composers such as Oliver Knussen and George Benjamin have also employed Chords of Transposed Inversion, to some extent remodelling the original device. It is to one of Knussen’s uses of the technique that mine bears a relatively close resemblance. The connection between Messiaen’s initial technique and my own practice is indirect and less clear-cut; for the present purposes, this corner of Messiaen’s harmonic world need not concern us analytically.²¹³

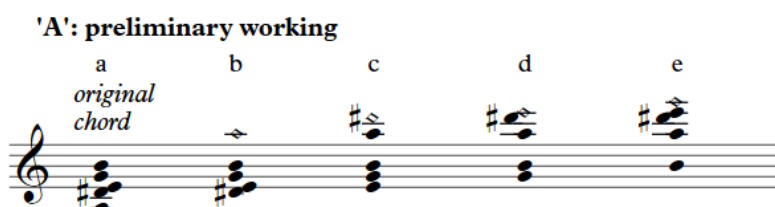
²¹¹ *Velvet Revolution* – audio file, 8:03-8:26.

²¹² Evidently, the Mozart example features melodic embellishments and variations of existing portions of phrases. But the harmonic essence of each fragment remains unchanged: there is no new harmonic material.

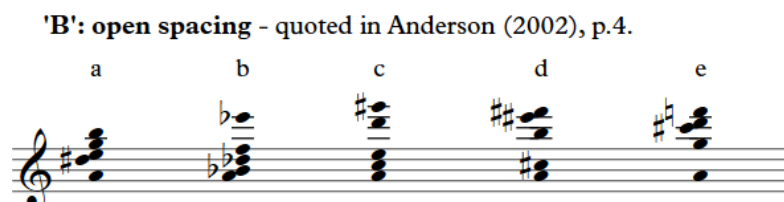
²¹³ For a summary of the technique as conceived and employed by Messiaen, see Mittelstadt, James: ‘Resonance: Unifying Factor in Messiaen’s Accords Spéciaux’ in *Journal of Musicological Research*, vol.28, n°1 (2009), pp.42-45.

Julian Anderson (2002²¹⁴ and 2003²¹⁵) has examined the technique as handled by Knussen in *Flourish with Fireworks* (1988, rev.1993)²¹⁶ and other works. Anderson (2002) demonstrates the process by which Knussen derives Chords of Transposed Inversion via three stages – ‘A’, ‘B’ and ‘C’ below.²¹⁷ The first, preliminary stage involves successively inverting a single chord in a specific, somewhat narrower sense than that defined by Rameau ([1722] 2014).²¹⁸ That is, one takes the lowest pitch of the chord, and places it in a higher register at the top of the chord, keeping the vertical positions of pitches otherwise intact, to produce a second chord (Anderson).²¹⁹ One then repeats the process (Anderson). Diamond heads (my addition) indicate new pitches:

Knussen, Oliver: *Flourish with Fireworks* [1988/1993]
Chords of Transposed Inversion, quoted in Anderson (2002), p.4.



Stage ‘B’ involves transposing the chords, so that all share the same bass note (Anderson):



²¹⁴ Anderson, Julian: ‘Harmonic Practices in Oliver Knussen’s Music since 1988: Part I’ in *Tempo*, n°221 (Jul. 2002), pp.4 and 8.

²¹⁵ Anderson, Julian: ‘Harmonic Practices in Oliver Knussen’s Music since 1988: Part II’ in *Tempo*, vol.57, n°223 (Jan. 2003), pp.18 and 30.

²¹⁶ Knussen, Oliver: *Flourish with Fireworks*, op.22 [1988/1993], online audio (28.8.2015): <<https://www.youtube.com/watch?v=wUQaR03xFp0>>.

²¹⁷ Anderson, Julian: op.cit. (2002), p.4.

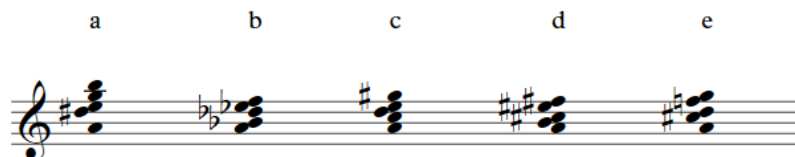
²¹⁸ Rameau, Jean-Philippe: *Treatise on Harmony*, transl. Philip Gossett, New York: Dover, ([1722] 2014), pp.xlvi, 40-43 and elsewhere. This comment is mine, as is footnote 219 below. Otherwise, I am summarising Anderson.

²¹⁹ Rameau’s definition of inversion (ibid., pp.xlvi, 40-43) does not prescribe that pitches should remain registrally fixed in this manner: for Rameau, effectively, the only relevant spacing concern is the lowest pitch-class. Unlike Knussen’s practice, Messiaen’s original version of the Chords of Transposed Inversion technique *does* allow some degree of free registral transference.²²⁰ It is only the form of inversion practiced by Knussen in this specific case – the ‘B’ chords above – that is effectively more narrowly defined than that of Rameau. As will shortly be demonstrated, it is precisely to these chords that the technique that I employ lies closest.

²²⁰ See Mittelstadt. James: op.cit. (2009), p.44.

A third, optional stage, 'C', involves transposing the higher pitches further down, so that all chords are registrally confined to within an octave (Anderson) – except, it seems, the original chord:

'C': 'close position' - quoted in Anderson (2002), p.4.



Knussen uses both 'B' and 'C' chords. According to Anderson, the characteristics of such chords are as follows:

'They retain the basic harmonic flavour of the original chord, as their interval content is entirely dependent on it; on the other hand, they extend and elaborate that initial chord by exploring its internal interval characteristics thoroughly. They make especially satisfying progressions, as the ear can easily follow the internal movement of the voices through succeeding chords, each of which has at least the bass note (and frequently more than that) in common with its predecessor. Above all, they reinforce the prominence given to the lowest pitch in the initial chord, as all inversions are transposed onto it. Given the importance of the pitch A in both these chords and in the linear rotations outlined above,²²¹ this pitch starts to assume the function of a focal point to the harmony, an easily recognizable modal tonic which guides the ear through the many simultaneous complexities of the music's textures.'²²²

I concur with most of this, although I would prefer 'quasi-tonic' to 'modal tonic'. Further, I contend that the common bass note will not 'function'²²³ in such a manner in all possible contexts: the description only fits if the pitch is heard as a *repos*. As will be illustrated shortly, such a pedal note or 'focal point' may just as easily serve as an extended *tendance*. Where the pitch demands a harmonic resolution, the term 'tonic' cannot apply. If anything, in such cases, its 'function' would lie closer to that of a quasi-dominant or quasi-subdominant – but such terms would only genuinely suit where the interval between the 'focal' pitch and its desired resolution were a 5th in either direction. In certain instances, since a succession of Chords of Transposed Inversion can effectively create a

²²¹ I.e. Stravinsky/Krenek rotations. This well-documented technique will feature later in this chapter.

²²² Anderson, Julian: op.cit. (2002), p.4.

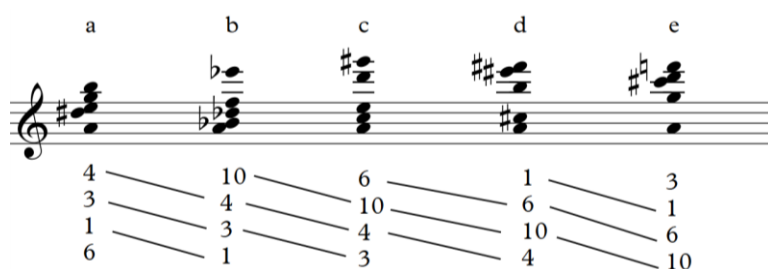
²²³ The term 'function' is also problematic in non-diatonic contexts, due to its diatonic connotations. I contend that in relation to music written using the 4,096, the term 'function' can only unambiguously serve to denote chordal relations that, to a fair degree, replicate those commonly encountered in *functional harmony*. Specifically: where, for a sustained stretch, one may effectively hear chords I, IV, V and so on – see this paper, pp.79-81. I prefer to avoid referring to 'functions' outside such contexts. Put differently: for me, a quasi-tonic or 'modal tonic' on its own is not enough to justify the term 'function'.

tendance pedal, the technique can generate true harmonic *tension* by delaying the resolution.

Conversely, if the spacing of the original chord is not conducive to *Klangverwandtschaft* in the first place, that aspect of its ‘internal interval characteristics’ will often spread to the remaining chords – at least the ‘B’ chords (open spacing). Consequently, in such cases, the bass pitch might not take on any discernible grammatical ‘function’ at all. One may observe this by applying the process to chords *i*, *ii* and *iv-xii* listed in Chapter 3.²²⁴

The larger significance is that, spacing permitting, successions of such chords will partially suspend the progress of the harmony, via a combination of the pedal bass note and the recycling of intervals. Chords of Transposed Inversion can therefore constitute an effective vehicle for harmonic prolongation: either delaying an expected resolution to a *repos*, or cementing a *repos*.

I do not, however, use Chords of Transposed Inversion in the form shown above. I use a related technique, born of my own analytical misreading of a group of chords from Boulez’s *Répons* (1985), many years ago.²²⁵ The distinction between the two techniques may be demonstrated by applying the version that I favour to the first Knussen chord. The B chords given above may be considered from another angle:



That is: rather than conceive the process as a chain of neo-Rameauan²²⁶ inversions – i.e. vertical *pitch-class* rotations – which are then transposed, one may simply rotate the *intervals* of the original chord. But the interval 10 (i.e. a minor 7th) featuring in chords b-e above is new. It does not appear in

²²⁴ See this paper, pp.26-29. In practice, some of the transformations of chord *iii* (p.27 - Stockhausen) would begin to clarify roots.

²²⁵ Boulez obtained these through a third, separate technique, to be illustrated later in this chapter.

²²⁶ See this paper, p.92, including footnote 219.

the original chord; it is created by the first neo-Rameauan inversion.²²⁷ Thus, mathematically, there is a missing pitch at the top of each chord. The full version would be:

The image shows five chords labeled a, b, c, d, and e on a single staff. Chord 'a' has a diamond head above the top note. Below the staff is a matrix of intervals (10, 4, 3, 1, 6) connected by lines to the notes of each chord.

Chord	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5
a	10	4	3	1	6
b	6	10	4	3	1
c	1	6	10	4	3
d	3	1	6	10	4
e	4	3	1	6	10

But this is not a rotation of the intervals of the original Knussen chord. Given the contents of chords b, c, d and e as they appear in *Flourish with Fireworks*, the high A completes the matrix, but the pitch does not appear either in the first chord or in the others. By applying the same intervallic rotation mechanism to Knussen's original chord as it stands, one obtains:

The image shows four chords labeled a, b, c, and d on a single staff. Chord 'a' has a diamond head above the top note. Below the staff is a matrix of intervals (4, 3, 1, 6) connected by lines to the notes of each chord.

Chord	Interval 1	Interval 2	Interval 3	Interval 4
a	4	3	1	6
b	6	4	3	1
c	1	6	4	3
d	3	1	6	4

Diamond heads (above) indicate pitches that do not appear in the chords obtained by Knussen. Many of Anderson's observations concerning Chords of Transposed Inversion still apply here. Since the bass note remains the same, and the intervallic content is recycled, such chords, likewise, may enable harmonic prolongation under the right conditions. But the results of the technique that I favour differ subtly from those obtained by both Knussen and Messiaen in several respects. Firstly, with the technique that I have adopted, the intervals between adjacent pitches are exclusively those contained within the original chord: in this respect, the relations between chords are even more tightly knit. Secondly, with the technique that I employ, the range of each chord is identical: again, a closer link. Thirdly, whilst in both Knussen and Messiaen,²²⁸ the interval-class set of each new chord

²²⁷ See this paper, p.92: 'A. preliminary working' – chord b.

²²⁸ See Mittelstadt, James: op.cit. (2009), p.44.

is identical, with the device that I favour, that is rarely the case: in this respect, closer bonds are forged via Chords of Transposed Inversion, in their various guises. Finally, the device that I use generates *two* pedals – the highest and lowest notes. The higher pedal serves to restrict the boundaries of the harmonic movement further still, enhancing the potential for harmonic prolongation.

To distinguish the technique that I utilise, whilst acknowledging the close relation to Chords of Transposed Inversion, I am opting for the formulation ‘Chords of *Locked*, Transposed Inversion’: that is, the range of each chord is locked within the high and low pedal pitches. ‘Locked, Transposed Inversions’ will serve as an abbreviation. I use the phrase with some hesitation. I am effectively transposing portions of chords. But I am ‘inverting’ them neither in the wider Rameauan sense nor in the neo-Rameauan sense illustrated above, since I am rotating *intervals* and not *itches*.²²⁹ Nor does my technique – in itself – involve ‘inverting’ the chords in the distinct *Schoenbergian* sense, in which one reverses the vertical order of intervals. To sidestep this terminological dilemma, for our purposes, I suggest that my technique could be considered a *false inversion* – that is, an intervallic rotation posing as an ‘inversion’, purely to avoid a greater terminological absurdity.

Bars 279 to 303 (pp.36-37) of *Madame de Meuron* illustrate a structural application of the technique. Here, the device operates in symbiosis with two ‘Alwa’ Hall of Mirrors cycles to sustain the harmonic influence of a pedal A for nearly a minute. The ‘Alwa’ cycles generate a certain harmonic flow, albeit tempered by the pedal A. The Locked, Transposed Inversions serve to temporarily stem that flow; delaying the next step in the Hall of Mirrors progression on five occasions, to varying degrees. In this way, the rate of harmonic change is controlled throughout.

In the reduction below, Locked, Transposed Inversions are shown in colour:

²²⁹ To use a term such as ‘chordal intervallic rotation’ would only create further confusion with another distinct technique of chordal intervallic rotation employed by Stravinsky, Knussen (again) and others,²³⁰ which has far less in common with the technique that I use than do Chords of Transposed Inversion.

²³⁰ See Anderson, Julian: op.cit. (2002), pp.2-4. Above all, Example 4, p.4.

Madame de Meuron

Locked, Transposed Inversions in context: pp.36-37, b.279-303

B 'Alwa' cycle

♩ = 108

279

6 8 4 5
2 5 2 4
2 3 2 8 2 3 2 5 4 4

1a 1e [false 6*] 11a 11b 4

*Two pitches changed.

NB: '1' denotes a hexachord comprising elements 1, 2, 3, 4, 5 and 6 from the 12-note row.

A inversion 'Alwa' cycle

285

2 8 6
7 2 8
2 7 2 2 6 6 2 2 2 2

1 8a 8e 8d 3 10

291

7 2 2 2 5 6
6 6 2 2 7 2 2 2 2 2

4* 12 7 7i* 2 9 4 6* 11*

*Substituted for 5.

*Inverted, in the Schoenbergian sense.

*6 and 11 swapped.

B 'Alwa' cycle

298

2 5 6 7 5 2 2 2
6 6 2 2 7 2 2 2 2 2

1 3 6* 2a 2b 2c 2e 9

*Direction reversed.

The grammatical role of the central A is initially established via the low pedal of the first Locked, Transposed Inversion episode (red), and subsequently prolonged, above all, via the green and pink episodes. Without these three groups of chords, the A would have been gratuitous. Neither the A,

despite its prominence, nor the Bb low pedals of the two other Locked, Transposed Inversion episodes operate as quasi-tonics in the manner suggested by Anderson. Still less the high pedals. The low A is an extended *tendance*. Indeed, it only sounds as a root at 1e (red) and 2c (pink). There are even diatonic 1st and 2nd inversions at 1a, 2b and 2e. Were the A to have sounded more frequently as a root, the element of *tendance* could not easily have been sustained for so long, at least in my idiom: past a certain point, it would have begun to take on the character of a *repos*. In practice, although the final chord 9 releases the A's grip, the *tendance* is simply transferred to another textural strand; the *contextual* dissonance resolves to another *contextual* dissonance.

A brief comparison may be made with bars 354 to 363 (pp.43-44) of the same piece. Here, as in the passage examined above, Locked, Transposed Inversions serve to temporarily contain the momentum of an 'Alwa' cycle, albeit on a smaller scale, at just three strategic points. In this case, the overall harmonic pace is considerably faster. In such a passage, the effect of the technique can easily be overlooked, but touches such as these facilitate a finer control over the harmonic flow:

Madame de Meuron

Locked, Transposed Inversions in context: pp.43-44, b.354-363

A 'Alwa' cycle

♩ = 100

8 1 6 11 4 9a 9b * 7 12 5 10 3a 3b 3c 3d

354

*2 omitted.

transposed retrograde

3e 3 10 5 12 * 7 9b 9a 4 11 6 1 8

359

*2 omitted.

The pink Locked, Transposed Inversions serve both to prolong and to demarcate the end of the first phrase. In the process, they also help to highlight the change of harmonic colour at the start of the second, retrograde phrase, with its shift to a slightly lower register. The purpose of the double omission of Hexachord 2 from the 'Alwa' cycle was to maintain the high C#/Db and G#/Ab pedals respectively for an extra chord. The effect is subtle: Hexachord 7 momentarily provides an extra gradation between the two levels of harmonic change.

By contrast, in certain sections of another relatively recent piece of mine, not included in this portfolio – *Prosthesis* (2014) for solo piano – Locked Transposed Inversions operate over more extended stretches. From an 'Alwa' cycle of 12 octachords, at certain points, I employ not only up to seven Locked, Transposed, [False] Inversions²³¹ of a given sonority, but also, in some instances, the *Schoenbergian* inversions of those false inversions. Consequently, where desirable, the same high and low pedals can be sustained for longer spells, allowing new medium-term structural possibilities:

Hollington, Barnaby: *Prosthesis* [2014] in *Beauty and Hope in the 21st Century - Nine Works for Solo Piano*
Gerakas: Editions Musica Ferrum (2014).

pp.50-52, b.94-137.

'Alwa' octachordal cycle (until b.133)

♩ = 126
94

*1if denotes 1f, inverted in the Schoenbergian sense.

99

²³¹ See this paper, p.96.

105

1ia 1a 1b 1c 1d 1e

111

1f 1g 8 1e 1f 1g

117

** 5a 5b 5c 5d 5e

**Chords 3 and 10
omitted from cycle.

123

5a 5b 5f 5g 12

129

7 2 9 2* 9* 12*

*Down a 5th.



Between bars 94 and 127, the harmonic structure operates on two levels: a), the continual, regular but restricted chord-to-chord movement; and b), on a broader level, a single, decisive switch from the C/F# pedals bound to Octachord 1 to the G/B pedals tied to Octachord 5, disregarding a brief, isolated flash of another harmonic colour (b.113). The various constraints operating throughout the first part of this passage, affecting *affinities*, roots and register, greatly enhance the effect of b.128, where the Locked, Transposed Inversion technique is discarded, opening the harmonic and registral floodgates. Taken individually, each half of the excerpt could not be sustained for much longer in the same vein without sounding formulaic. Indeed, were one to ignore harmony altogether, in rhythmic and gestural terms, the entire excerpt would seem utterly mechanistic. And yet a compelling, organic structural momentum is created – or at least, that was my intention – entirely through a combination of harmony, register and dynamics (not shown here, but self-evident from the pitch-content). Of these, the pivotal element is unquestionably harmony. In this respect, the effect of this passage stands in stark contrast to that of much serial music. At least, that holds if one takes the following description from Richard Taruskin ([1996] 2008) as representative of a wider compositional trend:

‘Because there is no structural connection between the expressive gestures and the twelve-tone harmonic language, the gestures are not supported by the musical content (the way they are in Schumann, for example, whose music Mr Martino professes to admire and emulate). And while the persistent academic claim is that music like Mr Martino’s is too complex and advanced for lay listeners to comprehend, in fact the expressive gestures, unsupported by the music’s syntax or semantics, are primitive and simplistic in the extreme.

In so far as he seeks to be expressive, the composer is forced to do without language altogether. Where Schumann could make his most telling expressive points by means of subtle gradations of harmony, Mr Martino can be expressive only in essentially inarticulate ways, the way one might

communicate one's grossest needs and moods through grunts and body language. Huge contrasts in loudness and register, being the only means available, are constant. The combination of gross expressive gestures for the layman and arcane pitch relationships for the math professors is a perpetual contradiction. It fatally undermines the esthetic integrity of the music.'²³²

Chords of Locked, Transposed Inversion, however, are the epitome of 'subtle gradations of harmony'. That is the key to their success as prolongation devices. By definition, they shut down external registral movement altogether, relying entirely on fine harmonic adjustments within very tight parameters. Indeed, there are no sudden registral movements at all in any of the non-diatonic musical examples featured in this chapter – excepting a single, moderate case: a melodic leap of an 11th in the second excerpt from *Madame de Meuron*.²³³ Moreover, the same holds throughout most of this paper and portfolio of compositions. Most of my music is serial – often dodecaphonic – and yet it is above all harmonically driven, to a degree rare even among *non*-serial composers of ostensibly 'atonal', 'non-tonal' or 'post-tonal' music. I submit that in my case, the serial aspect never 'undermines the esthetic integrity of the music.' In fact, it actively facilitates it.

As with most serial devices,²³⁴ the *mathematical* relations between Chords of Locked, Transposed Inversion are arcane, from the listener's perspective, if elementary when considered in numerical terms. However, with this technique, the *pitch* relationships are not only audible but – if sensitively handled – alluring. In spacing any given chord, I begin with the desire to clarify roots and *Klangverwandtschaften*. That is, the desire to create a sonority that is aurally satisfying in itself, on every level. I then experiment with possible transformations, to discover which, if any, are similarly satisfying – that is, usable. Whether these transformations are actually used is another matter.

In practice, certain types of chord lend themselves more readily to Locked, Transposed Inversion than others: in the passage given above, Octachords 1 and 5 happen to have been especially suited

²³² Taruskin, Richard: 'How Talented Composers Become Useless' [1996] in *The Danger of Music*, Berkeley and Los Angeles: University of California Press, (2008), pp.87-88.

²³³ See this paper, p.97, b.293. Effectively, the interval is heard as a perfect 11th, regardless of its enharmonic spelling.

²³⁴ Some might contend that Locked, Transposed Inversions are in fact *post*-serial devices. I consider that they effectively treat the intervals between adjacent pitches of a generative chord as a *vertical* series, to be rotated.

to such treatment. But since the intervallic qualities of the generative chord are always passed on to its intervallic rotations, albeit in modified forms, then – provided that the initial sonority is well-spaced – there is a fair chance that its transformations will also prove successful. On the other hand, problems can arise – for example where the rotation process generates octaves. Those octaves which happen to strengthen existing *Klangverwandtschaften* can work well in certain circumstances. But where the octaves go against the harmonic grain, upsetting the balance between roots by emphasising a peripheral element of the original sonority, they can compromise the coherence and euphony of some or all of its Locked, Transposed Inversions. In the case of Octachord 1 above, the octaves go with the grain (see red pitches). None of the rotations of Octachord 5 produce octaves.

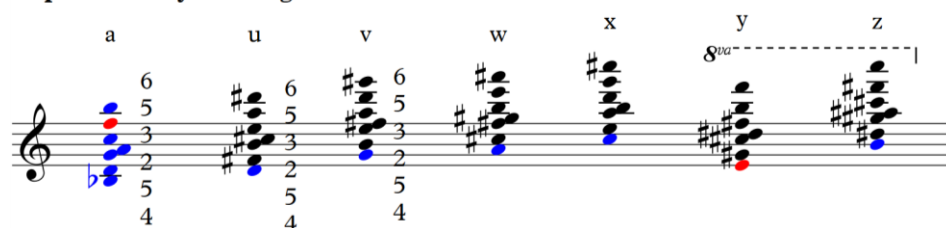
We may gain further perspective by considering the aforementioned third technique employed by Boulez, in which – again – a single chord generates a group of audibly related chords. Like the Locked, Transposed Inversion device, the Boulez device generates two pedals – high and low. Likewise, again, the pitches of each chord keep strictly within those two registral markers. Again, to varying degrees within the group of chords, intervals are recycled from the original chord. Hence, this device is also well-suited to the purposes of harmonic prolongation. Indeed, in aural terms, the distinction between it and the technique that I favour is quite fine.

At figure 21 of Boulez's *Répons* (1985),²³⁵ we hear six arpeggiated chords – *u-z* in Example B below.²³⁶ These are related to a generative 7-note sonority (*a*).²³⁷ The new chords were obtained via two stages. Firstly, the initial chord was transposed six times. With one exception (red), the lowest pitch of each transposition occurs in the first chord (blue):

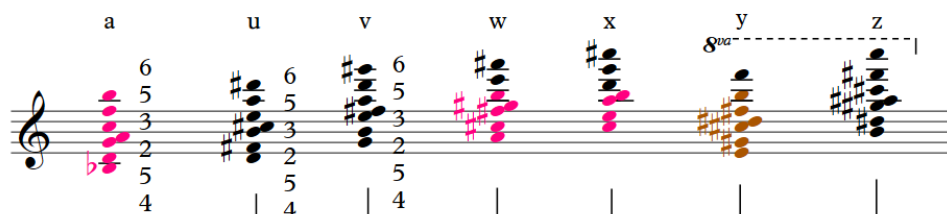
²³⁵ Boulez, Pierre: *Répons* [1985], Vienna, London and New York: Universal Edition – UE 32365 (Fassung II, [1981] 1985), p.25, figure 21.

²³⁶ Boulez, Pierre: *Répons* [1985], online audio (31.8.2014): <<https://www.youtube.com/watch?v=NK3YoFSQp08>>, 6:25-7:00. For the present purposes, so as to demonstrate Boulez's technique as clearly as possible, I have listed chords *u-z* here in a different order to that in which they sound in *Répons*. That order is: *z, v, u, x, w, y*.

²³⁷ In the audio extract listed above, the large chord heard at 6:25 is a chord multiplication of *a*. My own use of chord multiplication, although distinct, owes a great deal to my analyses of various Boulez scores, many years ago – not least to this very chord. In this area, I owe further debts to Lutosławski, as illustrated in Chapter 6. Examples of my use of the technique appear in this paper, pp.59-70 and 83-87.

A: preliminary working

Subsequently, most of the pitches were transposed, so that all lay within the range of the initial chord (see below). Each chord happens to contain a B. Chord y appears to have been transposed down a semitone for that purpose, allowing the creation of a high pedal B. Where the low Bb/A# did not feature in the preliminary chord, it was then added (green). Pink pitches given below indicate portions of the preliminary chord which were kept untransposed. Brown pitches denote a portion of y that was transposed down an octave, wholesale. Since z shares most of its pitch-classes with y; these were fixed in the same register (diamond heads):

A: preliminary working**B: actual chords**

Whilst Boulez's working is very different to mine, the aural similarity with the Locked, Transposed Inversions shown below – which do not feature in *Répons* – is readily discernible. The origins of my old analytical error²³⁸ should be clear from the pink and brown elements of these chords:

²³⁸ See this paper, p.94.

C: Locked, Transposed Inversions

The image shows six musical examples labeled a through f, each representing a different locked, transposed inversion of a chord. Each example is written on a treble clef staff in 4/4 time, with a key signature of one flat (B-flat). The notes are grouped in a way that suggests a specific fingering, indicated by the numbers 1 through 6 written below the staff and connected by lines to the corresponding notes.

Up to now, we have examined chords and successions of chords. By contrast, the final type of harmonic prolongation technique to be discussed here is essentially melodic. In serial terms, it operates as follows:

The image shows eight melodic sequences labeled a through h, each written on a treble clef staff in 4/4 time, with a key signature of one flat. The sequences are labeled as follows: a forwards, b backwards, c forwards, d backwards, e forwards, f backwards, g forwards, and h backwards. Each sequence is followed by a set of numbers (1-8) connected by lines to show fingerings.

The device seems especially suited to 8-note rows, divided into 5-note segments. I have yet to find another combination that works to my satisfaction, although surely, other aurally viable alternatives must exist. Essentially, one repeats the 8-note row five times, divides the resulting 40-note line into 5-note segments, and then retrogrades every second segment. Provided that the original 8-note cycle makes melodic sense in both directions, repeated back to back, this serial transformation is likely to yield promising results in most cases. As a by-product, the first elements of each 5-note group will follow in sequence (see numbers in bold). Therefore, in certain passages from both *Velvet Revolution* and *Madame de Meuron*, I present the device in the form of quintuplets, giving

performers the option of a slight accent on the first of each group of five, to bring out the hidden line. I am unaware of any precedents for this exact technique, although the results seem to recall certain melodic phrases from works by Franco Donatoni such as *Etwas ruhiger im Ausdruck* (1967),²³⁹ *Clair* (1980)²⁴⁰ and *Nidi II* (1992).²⁴¹ For our purposes, I am labelling it ‘Alternating Current’ or ‘AC’ – a reference to the constant switches between the original order of pitches and its retrograde.

An AC strand is simply a continuous reordering of a fixed set of 8 pitches: it is harmonically static. It can therefore provide an effective short-term structural counterweight to more mobile serial melodic and harmonic activity. The 8-note row given above is a portion of a 12-note row (**A4**) featuring in *Madame de Meuron*. In the example below, successive melodic statements of **A4** eventually progress to a full AC strand, before briefly switching back again. Evidently, the two melodic types do not mould the entire short-term harmonic structure unaided: here, they are by turns juxtaposed, superimposed and dovetailed with fragments of Hall of Mirrors cycles. But in this instance, since they are mostly left unaccompanied except for a single note, they play a vital role in shaping the short-term harmonic course:

♩ = 108

Madame de Meuron

AC Rotations of Row **A4**, pp.15-18, b.120-136

♩ = 108

Inversion, up a 4th

Retrograde Inversion

120 1 2 3 4 5 6 7 8 9 10 11 12

12 11 10 9 8 7 6 5 4 3

Interlocking Hall of Mirrors cycle

²³⁹ Donatoni, Franco: *Etwas ruhiger im Ausdruck* [1967], online audio (16.6.2015): <<https://www.youtube.com/watch?v=ePpathkZank>>, ca.3:30-8:40.

²⁴⁰ Donatoni, Franco: *Clair* [1980], online audio (18.8.2013): <<https://www.youtube.com/watch?v=BXxLOdfNk0s>>, 4:28-6:42.

²⁴¹ Donatoni, Franco: *Nidi II* [1992], online video (13.3.2014): <https://www.youtube.com/watch?v=Qg1bv_JLBE8>, 0:00-1:33 and 2:48-4:39.

Original (part)

Retrograde

Inversion

'Alwa' cycle (part)

The angular melodic movement can be heard as three separate voices – high, middle and low. I consciously model this type of multi-voice monophonic line on certain passages from J.S.Bach's sonatas and partitas for unaccompanied violin, which operate similarly in this respect.²⁴² The structural purpose of the focal high C# (b.127-132) is readily apparent if one traces the progress of the upper voice (red). The retrograde form of **A4** (b.127-128) helps to prepare the ground for the AC strand by presenting all 8 of its pitches (green). Bars 125-126, 127-128 and 129 onwards establish a regular phrase pattern. And evidently, all strands share many intervallic connections. These factors,

²⁴² For example, Bach: Johann Sebastian: *Partita II, BWV 1004* [1720] in *Three Sonatas and three Partitas for Solo Violin, BWV 1001-1006*, Kassel: Bärenreiter – BA 5116 (1958), *Ciaccona* p.38, b.217-224. Also Bach, Johann, Sebastian: *Chaconne from Partita n°2, BWV 1004* [1720], online audio (7.12.2012): <<https://www.youtube.com/watch?v=QqA3qQMKueA>>, 14:43-15:19. Other stylistic and technical influences on this type of melodic line include Boulez, Berio and the aforementioned Donatoni.

and more besides, combine to allow the AC strands to be heard as a natural progression from what has gone before, despite the fragmentation of the line.

The two types of melodic strand operate symbiotically to help control the harmonic ebb and flow, up to a point. Obvious comparisons can be drawn between the melodically-driven interplay of mobility and stasis illustrated here and the combined action of Hall of Mirrors cycles and Locked Transposed Inversions examined earlier. For example, b.133 here, b.303 of the same piece²⁴³ and b.128 of *Prosthesis*²⁴⁴ all involve a considerable release of harmonic energy, following a shorter or longer episode of harmonic prolongation.

To sustain an AC melodic line for a longer stretch, enabling a longer prolongation, one must introduce another element of some kind. This is the case in the closing section of *Nevermore* (pp.13-15, b.155-186), which consists mainly of an extended, largely unaccompanied melodic line constructed from a single 8-note cell.²⁴⁵ I began by applying Stravinsky/Krenek rotations²⁴⁶ to the initial cell, as shown below. Only six lines of a possible eight were used:

The image displays six staves of musical notation, each representing a different rotation of an 8-note cell. The notes are connected by lines, and some are highlighted in red. The staves are numbered 1 through 8 at the top, and the notes are numbered 1 through 8 below them, indicating the sequence of the 8-note cell.

²⁴³ See this paper, p.97. See also the full score of *Madame de Meuron*, p.37, to consider the full textural effect.

²⁴⁴ See this paper, p.100.

²⁴⁵ *Nevermore* – audio file, 5:02-6:08.

²⁴⁶ The technique is well documented. See Whittall, Arnold: *Serialism*, Cambridge: Cambridge University Press (2008), pp.138-139. See also Anderson, Julian: op.cit. (2002), pp.3-4.

I then generated AC strands from each of the six lines. The results were selectively deployed to create the following passage:

Nevermore

AC Rotations of Stravinsky/Krenek Rotations, pp.13-15, b.155-182

♩. = 40
(♩. = 80)

Matrix, 1st line:

155

2nd line:

162

3rd line:

167

4th line:

171

5th line, down a 4th:

176

The musical score is written for piano and bass. The piano part is in 3/8 time, and the bass part is in 6/16 time. The tempo is marked as 40 beats per minute. The score is divided into six systems, each corresponding to a line of the matrix. The strands are labeled a, b, c, d, and e. The strands are color-coded: blue for the first line, red for the second line, green for the third line, and pink for the fourth line. The strands are deployed across the passage, with some strands appearing in multiple systems. The passage ends at measure 176.

Each successive AC episode serves to suspend the harmonic movement: the harmony progresses only incrementally from strand to strand. One may trace the overall course by following two separate voices within the melodic line. The overall movement of the highest voice (all colours other than blue) is steadily downwards, from the high B (b.163) to the mid-register B (b.177), finally joining the mid-register blue voice on the low F (b.182). The blue voice – mostly a held G#; the common pitch between the various lines of the Stravinsky/Krenek matrix – also eventually progresses downwards: the movement to D# in bar 174 is crucial in preparing the final low F, where the voices link up. This was the reason behind transposing the 5th line of the matrix down a 4th. In b.170-173, other textural elements provide further downward movement.

Clearly, the structural purpose of this section is to gradually wind down the piece, with several parameters simultaneously contributing towards that end. In harmonic terms, the stasis of the G# pivot, the in-built intervallic restrictions of both the Stravinsky/Krenek Rotations and the AC strands, and the downward registral trend are all crucial medium-term structural factors. Notably, whilst the extended G# serves as a ‘focal point’, in Anderson’s terms, it does not ‘function’ as a quasi-tonic at any stage.²⁴⁷ With each new AC strand, the G#’s harmonic relation to its surrounding pitches shifts, but ultimately the gravitational force of the line demands that the G# be pulled downwards, like every other element. Even the D# pivot to which it falls ultimately serves only as a flattened leading note to the final *repos* F (b.182).

The following three chapters will pick up various threads from this one. In Chapter 9, we shall examine the harmonic aspect of my melodic writing in greater detail. This will prepare the ground for a study of various types of harmonic interaction between multiple strands, both linear and chordal, of more complex textures than those featured hitherto, in Chapter 10. Once these angles have been covered, we can consider a fuller picture still. In Chapter 11, we shall explore in greater

²⁴⁷ See this paper, p.93. Anderson’s assertions (2002) quoted on that page pertain both to Chords of Transposed Inversion and to Stravinsky/Krenek Rotations – indeed, specifically to their combined effect in Knussen’s *Flourish with Fireworks* (1988/1993).

depth questions of 'focal points' – under a different name –, quasi-tonics and harmonic gravitation from a longer-term structural perspective.

9. Serial Melody

‘If the identity of the material is not in the timbre, it must be in the shape, the rhythm or in the intervals. Serialism actually taught me many things, notably in its notion of structure, where the potential for organic growth is very attractive. That can lead to an extreme diversity of material within a structure that remains coherent; a fascinating model. But superimposing heterogeneous material, in a post-modern way, is superficial. It exploits the surface of things instead of searching beneath and finding the deepest links within the diversity. A heterogeneity where everything can be combined, integrated and transformed in a profound way, with a real communication between materials, is much more interesting.’²⁴⁸

These words from George Benjamin to some extent counterbalance the same author’s assertion concerning the ‘loss of... everything that comes from mastery of harmony’ discussed in chapter 2.²⁴⁹ But as we have seen, within a serial context, the ‘identity of the material’ need not be confined to ‘the shape, the rhythm or... the intervals’. Since any given *set of pitch-classes* can secure one or more roots, through certain techniques (Chapter 5), any set can therefore assume a coherent and convincing *harmonic* identity, allowing it to operate grammatically on a chord-to-chord level (Chapter 6). *Strictly under these conditions*, certain serial structures can then channel the grammatical potential of these roots and *affinities* to string together successions of chords in lucid, compelling and satisfying ways (Chapters 7 and 8).

Likewise, in constructing a melodic line through serial means, I am never content to merely forge its identity out of ‘the shape, the rhythm... [and] the intervals’. Granted, as Benjamin maintains, an intelligent application of serial techniques can certainly facilitate ‘organic growth’ on each of these fronts. In melodic terms – that is, where a serial composer is concerned with melody at all – provided that the rigour and consistency come through in a sufficiently audible form (and that has not always been the case), this is one of serialism’s strengths. The listener’s perception of the various serial mechanisms need not be directly conscious, just as some of Brahms’ melodic

²⁴⁸ Benjamin, George, quoted in Risto Nieminen and Renaud Machart: *George Benjamin*, transl. Julian Anderson and Michael Durnin, London: Faber and Faber (1997), p.31.

²⁴⁹ See this paper, p.17.

techniques of developing variation – evidently an influence on Schoenbergian serialism – will not be explicitly identified by most listeners, but will help knit the music together on a subliminal level. But for me, concentrated motivic and intervallic working is not enough in itself. The *harmonic* identity of any given serial melody or line must also remain aurally coherent and seductive at every turn, and must likewise be allowed to grow organically. I see this as an essential precondition for ‘real communication between materials’.

It is well-known that, in terms of shapes, rhythms and intervals, Schoenberg’s approach to serial melody and line emerges from a tradition encompassing Bach, Haydn, Mozart, Beethoven, Brahms – especially – and others. The essential difference lies in the harmony. There are countless pre-Schoenbergian examples of proto-serial melodic thinking; just one will suffice to illustrate the point. Taken out of context, the following fragment from Mozart’s Piano Concerto n°9 (‘Jeunehomme’) in E flat major, K.271 features a transparently audible *Schoenbergian* inversion:²⁵⁰

Mozart, Wolfgang Amadeus: *Concerto in E-flat major for Piano and Orchestra, 'no.9', 'Jeunehomme', KV271* [1777]
Kassel, Basel, London, New York and Prague: Bärenreiter - TP 242 (2005).

1st movement, b.175-179, piano part only

Allegro

175

original

Schoenbergian inversion

178

²⁵⁰ Mozart, Wolfgang Amadeus: *Piano Concerto n°9 in E-flat major, K.271, 'Jeunehomme'* [1777], online audio (19.6.2012): <<https://www.youtube.com/watch?v=VB-bw7WodLY>>, 4:59-5:11.

Substitute an A for an Ab, and in serial terms, the correspondence is exact. But the relationship between the rhythmic and intervallic shapes owes much of its effectiveness to the harmonic function of this episode within a larger context, in which it anticipates and prepares movement to a sustained Bb dominant 7th, which in turn injects the necessary harmonic impetus into a return to Eb. Without that sustained, carefully channelled harmonic energy, the passage would lose both its poise and its purpose.

The following passage from the Minuet of Schoenberg's *Suite for Piano*, op.25 (1923) transforms basic melodic shapes along similar lines, albeit in an appreciably more concentrated and sustained manner. In fact, the motivic rigour is often quite readily intelligible to the listener, unlike many of the melodic gestures of, say, Boulez's *Le Marteau sans Maître* (1955). Indeed, in this case, for our purposes, many of the various retrogrades, transpositions and Schoenbergian inversions are sufficiently apparent to obviate the need for serial analysis altogether²⁵¹ – again, in stark contrast to *Le Marteau*. On this level, 'the shape, the rhythm... the intervals', and the 'communication between [melodic] materials' (Benjamin) are aurally coherent, and indeed engaging.

Heard as harmony, however, in comparison to the Mozart extract, the direction of travel remains far less clear, and to my ears far less persuasive. On a local level, to varying degrees, one hears roots – or what Richard Parncutt (2009) terms 'fleeting tonal references'.²⁵² Each of these begins to suggest possible harmonic implications.²⁵³ But as I hear it, no root – or would-be root – is allowed to exert any veritable grammatical influence on what follows. The result is a stream of harmonic *non sequiturs*.²⁵⁴

²⁵¹ For a succinct serial dissection, see Whittall, Arnold: *Serialism*, Cambridge: Cambridge University Press (2008), pp.40-43.

²⁵² Parncutt, Richard: 'Tonal Implications of Harmonic and Melodic T_n-Types' in *Mathematics and Computing in Music*, ed. Timour Klouche and T.Noll, Berlin: Springer (2009), p.124. In context: 'since every interval, sonority and melodic fragment has tonal implications, even the so-called "atonal" music of Ferneyhough, Ligeti and Nono is full of fleeting tonal references: at any given moment during a performance, some pitches are more likely than others to function as psychological points of reference.' See also this paper, p.41.

²⁵³ In Parncutt's terms, 'tonal implications'. See footnote 252 above.

²⁵⁴ Schoenberg, Arnold: *Suite for Piano*, op.25 [1923], online audio (10.11.2015): < https://www.youtube.com/watch?v=8XCjmuD_Er4>, 9:30-10:05.

Schoenberg, Arnold: *Suite for Piano, op.25* [1923]
Vienna: Universal Edition - UE 7627 (1952), p.17.

Minuet, b.34-44

NB: I have altered many accidentals, to better reflect the succession of chordal roots, as I hear them.

34

(VII) - I
Eb min

(V) - I⁶
C#

I⁴ - 3 V⁶ (IV) - I
B maj D min

F# min

38 1. 2.

(VII) - I
A Eb min A

II^b - V⁷ - I
(C min) B maj

D# min C# maj/min

42 1. 2.

D min (III) - I V⁶
B maj

II^b - V - I⁶
(C min) B maj F# maj

A⁷

Richard Taruskin ([2004] 2008) has argued along broadly parallel lines. Acknowledging Schoenberg's melodic debt above all to Brahms ('the supreme master of the "basic shape"'),²⁵⁵ Taruskin maintains that in the realm of melodic harmony, Schoenberg's methods fail where Brahms' developing variation had succeeded:

²⁵⁵ Taruskin, Richard: 'The Poietic Fallacy' [2004] in *The Danger of Music*, Berkeley and Los Angeles: University of California Press (2008), p.319.

‘What had set limits on earlier accomplishment [pre-Schoenberg]? Those very rules that subordinated dissonance to consonance. *Under traditional constraints, not every melodic idea can also function as a harmonic idea.* [My italics.] Under the regime of “emancipated dissonance,” it can. Emancipating the dissonance made it possible to integrate the musical texture beyond all previous imagining. It also became the site of greatest tension between esthetic and poetic criteria. Harmonic syntax, in particular, became incomprehensible to most listeners (including composers, when listening).’²⁵⁶

Taruskin stops short of claiming outright that ‘emancipated dissonance’, whether serial or not, automatically renders coherent harmonic syntax unattainable, melodically or otherwise. In a postscript to another article included in the same volume and cited in Chapter 8 of this paper,²⁵⁷ in which Taruskin levels similar criticisms at the serial music of Donald Martino, the author’s precise position is clarified:

‘Such attempts at traditional expressivity within a twelve-tone syntax were likely to be – and Martino’s definitely were – crude.’²⁵⁸

‘Likely to be’ acknowledges – just – the hypothetical possibility that other composers might perhaps have already devised, or might one day devise methods of achieving far more harmonically comprehensible, elegant and seductive results, within a serial framework.

This, of course, is territory that interests me creatively. My approach to linear writing typically seeks to exploit serialism’s natural capacity to facilitate ‘organic growth’ (Benjamin, 1997),²⁵⁹ without taking that aspect for granted. But in technical terms, that is relatively easy to accomplish. The challenge lies in allying that quality with harmonic coherence and euphony. On the latter two counts, I consider the extract from Schoenberg’s op.25 discussed above to have fallen short. But many new serial melodic techniques have been developed since 1923. In seeking the three goals listed above – ‘organic growth’, harmonic coherence and euphony –, unlike Schoenberg, I am in a position to draw lessons from nearly a century of serial melodic thought.

²⁵⁶ Ibid., p.319.

²⁵⁷ See this paper, pp.101-102.

²⁵⁸ Taruskin, Richard: postscript [2008] to ‘How Talented Composers Become Useless’ [1996] in *The Danger of Music*, Berkeley and Los Angeles: University of California Press (2008), p.89.

²⁵⁹ See this paper, p.112.

From among those sources, the Stravinsky/Krenek rotation technique discussed in Chapter 8²⁶⁰ counts among the more useful, especially when applied to smaller melodic cells. Where a generative cell comprises only 4-6 pitch-classes, its pivot (e.g. the low G and high D in the matrices shown below) assumes a more prominent role, helping to focus the harmony without necessarily operating as a quasi-tonic.²⁶¹ Moreover, the smaller the cell, the more concentrated the intervallic flavour of the resultant matrix. Motivically, this is a considerable asset. Stravinsky, Knussen and latterly, Boulez tend to favour cells comprising around 5-7 pitch-classes. These are surely among the reasons why.

The matrix given on p.108 of this paper is atypical of my practice in starting from an 8-note cell: in this instance, 8 pitches were necessary to create a viable succession of AC strands. Bars 228-236 of *Madame de Meuron* (pp.29-30) are more representative in this respect, featuring two matrices derived from 4-note segments of a generative 12-note row, **A3**:

The image displays two musical matrices, 8a and 12a, derived from a generative 12-note row. Matrix 8a (red) is an 8-note cell, and Matrix 12a (green) is a 12-note cell. Both matrices are shown in four staves, with pitch classes 1-12 indicated above the notes. Matrix 8a shows a sequence of 8 notes: 8, 9, 10, 11, 8, 9, 10, 11. Matrix 12a shows a sequence of 12 notes: 12, 1, 2, 3, 12, 1, 2, 3, 12, 1, 2, 3. The matrices are connected by lines, indicating their relationship to the generative row.

Since both matrices stem from interval-class set **1119**, there are readily audible interval-class links between both. The two pivots are polarised, both registrally and quasi-functionally: a low G quasi-tonic, kept registrally separate from the remainder of its matrix (aside from a single low Bb), versus a high D quasi-dominant. The polarity generates harmonic energy. But these are not the only reference pitches. The F# and G# in the first matrix, and the Eb in the second, each appear three

²⁶⁰ See this paper, p.108.

²⁶¹ See this paper, pp.93-94 and 108-110.

times in the same register. In practice, the Eb, especially, plays an important secondary role in the local harmonic structure. The registral fixity helps to crystallise a hierarchy of harmonic roles – a device learned from Boulez, but exploited to different harmonic ends. The position of the C in the second matrix, for example, allows it to be heard as a quasi-subdominant to the G.

Serial mechanisms such as the Stravinsky/Krenek matrices given above are merely a starting-point, to be combined and manipulated freely:

Madame de Meuron
pp.29-30, b.228-236 - serial analysis of melody

A3 row

1 2 3 4 (2 1 6 5) 12 11 10 9 8 7

Stravinsky/Krenek rotations

12a 12 1 2 3

12b 12c

8a 8 9 10 11

12d

8c 8d

In a similar vein to b.120-136 of the same work,²⁶² I add a further short-term harmonic twist by presenting a modified form of the full 12-note **A3** row at the outset, before narrowing the focus to the two **1119**-matrices. Here, as previously observed in b.120-136, within a tightly-knit framework of organic motivic and intervallic connections, the shift of focus helps to regulate the harmonic pace. At times, I bring all twelve pitch-classes into play; elsewhere, I hold back. Even where the total chromatic is deployed, I use register to help pull the listener's focus towards those relationships that possess greater intrinsic *affinity*: there is always an audible hierarchy of some kind.

We can now consider the progression of roots supporting the melodic line over a slightly longer stretch, running from bars 228-246 (pp.29-31):

²⁶² See this paper, pp.106-108.

The image displays three systems of musical notation for 'The Song of the Shovel' by Schoenberg, with chord progressions and tonal analysis below each system.

System 1: A3 row - almost

Measures 228-237. Chords: $C\sharp m$, $E\flat$, f , DM , $C\sharp m$, Dm , Cm .
 Analysis: **in G:** V - [I - - - I -] - - - - - IV -

System 2: AC strands

Measures 237-239. Chords: $E\flat$, B Phrygian (+ 7 \sharp), FM .
 Analysis: **Gm** I - - - - (IV) - (I) - (IV)]
in D: (IV)- (VII \flat)- (II) [I]

System 3: AC inversion (Schoenbergian)

Measures 239-240. Chords: $A\flat M$, FM , GMm .

Relatively strong roots are shown in colour below the stave; secondary roots are shown above it. Of the former, the low G (red) and F (pink) exert the strongest short-term structural influence. But both eventually cede to other harmonic forces. There are four points of *repos*. *Repos 1* is the first low G, established via a straightforward perfect cadence. *Repos 2* is the Eb (orange) in b.236, echoing the ends of both the second and third phrases (first line). *Repos 3* is the non-serial, neo-medieval cadence to D in bars 237-238, recalling the full third phrase. *Repos 4* is the final G, melodically mirroring the neo-medieval cadence (see boxes), but harmonically bound to the earlier low Gs (red). By this point the gravitational pull of the low F – arguably a temporary quasi-tonic – has weakened enough to allow this.

Repos 1 establishes a clear gravitational centre – G. *Repos* 2 and 3 move towards secondary quasi-tonal areas. Subsequently, the B (brown) and F (pink) effect a quasi-modulatory excursion. The short AC inversion centering on Ab (blue-green) injects further movement, sidestepping the in-built

harmonic stasis that any extended, unmodified AC strand will eventually achieve, whilst keeping intervallic and registral continuity with that longer strand. *Repos 4* avoids too strong a return to the quasi-tonic G, serving only as a momentary punctuation point in a wider harmonic thread. Several factors soften the return. First, the higher registral position of this G. Second, the absence of its quasi-dominant, D, since b.239. Third, the G's serial function as a seemingly unbroken, natural continuation of an AC episode, within which it had previously fulfilled other harmonic roles – the submediant of B Phrygian, the supertonic of F and the leading-note of Ab. Finally, the termination of the phrase at that very moment, followed by a prompt reversion to B Phrygian: the section from b.239 onwards is then repeated, with a significant new textural element added. Unlike the earlier low G, the higher G only sounds as a root and quasi-tonic on this single occasion.

Leaving aside the brief inversive sidestep to Ab, in fact, within a notional, unamended AC cycle, the G would never have sounded as a root. Instead, once established, the low F would have served as an anchor throughout. Two small alterations were enough to tip the harmonic balance of the second half of the cycle:

The musical notation consists of four segments labeled **e forwards**, **f backwards**, **g forwards**, and **h backwards**. Each segment is represented by a staff with notes and pitch class numbers above them. Segment **e forwards** has notes for [5], [6], [7], 8, and 1. Segment **f backwards** has notes for 6, 5, 4, 3, and 2. Segment **g forwards** has notes for 7, 8, 1, 2, and 3. Segment **h backwards** has notes for 8, 7, [6], 5, and 4. Below the first staff, a note reads: *NB: X-headed pitches are omitted in practice.* Below the fourth staff, a smaller staff shows a sequence of pitches: 8, 7, 5, 4, and 3, with arrows indicating relationships between the notes in the **h backwards** segment and this smaller staff.

Since the **e** segment follows from the inversive gesture, the omission of the first three pitches allows the Bb to be heard as a harmonic pivot: initially a supertonic to Ab, retrospectively, it also serves as a subdominant to F. By removing the low F from both the **e** and **h** segments (see above), I weaken its gravitational pull, thus allowing the high G (red) to take over.

As previously stated, the smaller the melodic cell to which serial or quasi-serial transformations are applied, the easier it becomes to render such transformations audible, directly or indirectly.

Where a generative melodic cell features just three pitch-classes, the connections between its various transformations are crystallised further, to the point where one can no longer properly consider it as a row at all. *Madame de Meuron* features such a three-note cell. The following table of serial transformations exists for the purposes of this paper, but would have been superfluous during the process of composition:

Madame de Meuron
3-note row (first three notes of row **A3**)

	R1	P1	I1	RI1
1st rotations	R2	P2	I2	RI2
2nd rotations	R3	P3	I3	RI3

Interval-class set **192** Interval-class set **129**

Between the three possible Stravinsky/Krenek rotations of the cell and their retrogrades, all six possible melodic orderings of interval-class set **192** are exhausted: any possible ordering will bear some straightforward serial relation to the prime form. In other words, a 3-note series can simply be treated as a pair of unordered, inversionally-related interval-class sets (in this case, **192** and **129**) – or else as a single unordered set, if uninvertible. Therefore, at certain points during the process of composition, I simply used melodic forms of **192** and **129** freely and intuitively, paying no conscious heed to specific serial relations.

Besides featuring as an autonomous 3-note would-be row, **192** and **129** also surface within most of the various 12-note series employed melodically throughout *Madame de Meuron*. In some passages, I strategically emphasise those portions of a row featuring **192/129** over others. Within bars 228-246, of the generative **A3** row, each of the portions selected for serial development are largely comprised of **192/129** cells (green, red, purple):

Prime **Retrograde**

Strav./Kren. *Strav./Kren.* *Strav./Kren.*

1 2 3 [4] [5] [6] [7] 8 9 10 11 12

12 11 10 9 8 7 6 [5] [4] [3] [2] 1

AC strand, from retrograde, down a tone

1 12 11 10 9 8 7 6

By contrast, elements 4 and 5 of **A3**, bearing no relation to **192/129**, are only allowed to appear once during the entire passage, in the very first phrase.²⁶³ The cumulative effect of these various serial manipulations is to bind the passage together, motivically:

228

237 238 239

NB: Blue pitches represent aurally obvious instances of **192** or **129**.

NB: Green pitches are *analytically* obvious, but aurally far less so. From the listener's perspective, they simply possess a similar harmonic flavour. In normal circumstances, the precise link will not be consciously identified by the listener.

Row **A3** is readily suited to such treatment. This is less true of another 12-note row, **B2**. Therefore, with **B2**, I employ other strategies. One of these is simply to append various melodic forms of the **192/129** cell to selected pitches of the **B2** row. A distinction is maintained between the sustained pitches of **B2** (in colour) and the shorter **129/129** gestures:²⁶⁴

²⁶³ See this paper, p.118. Elements 6 and 7 reappear in the AC strand (above, purple).

²⁶⁴ In the example below, 'P3', 'P2', 'I1' and so on refer to the chart on p.121.

Madame de Meuron

p.8, b.68-73 - serial analysis

$\text{♩} = 72$ **Row B2 (colour)**

The musical score is for Violin 1, Violin 2, and Violoncello (Vc.). It shows a serial analysis of Row B2, divided into three voices. The score is in 6/8 time, with a key signature of one sharp (F#). The music is divided into three measures. The first measure contains a whole note chord (P3) in Violin 2 and a whole note chord (P2) in Violoncello. The second measure contains a half note chord (RI1) in Violin 1 and a half note chord (I1) in Violoncello. The third measure contains a half note chord (R2) in Violin 1 and a half note chord (I2) in Violoncello. The Violoncello part also includes a half note chord (P3) in the first measure and a half note chord (RI1) in the second measure. The Violoncello part is divided into three boxes, each containing a half note chord (P3, I1, RI1) and a half note chord (I2, RI1, I2). The Violoncello part is divided into three boxes, each containing a half note chord (P3, I1, RI1) and a half note chord (I2, RI1, I2). The Violoncello part is divided into three boxes, each containing a half note chord (P3, I1, RI1) and a half note chord (I2, RI1, I2).

This short excerpt demonstrates another favoured melodic technique. In dividing a dodecapronic line registrally into several voices in the manner described in chapter 8,²⁶⁵ one typically arrives at a highly angular shape. The technique can greatly clarify both *Klangverwandtschaften* and motivic links: on a local level, these are considerable assets. But expressively, this imposes certain limits. Left unchecked, the angularity can become a mannerism. The solution employed here is simply to sustain the pitches of each voice, so as to create three separate lines, each of which, for the most part, avoids intervallic leaps.

Moreover, the division into three voices also afforded an opportunity to plant further **192/129** cells into each of the three voices (the three boxes). Thus, once again, in different circumstances and through a different route, the **192/129** cell permeates the entire melodic structure.

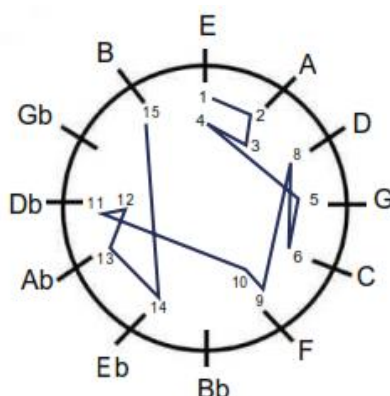
From a purely harmonic angle, taking the chordal roots of only those vertical sonorities lasting a quaver or longer, the harmonic progression traces approximately through the circle of 5^{ths}. The direction of harmonic travel was to some extent already implicit in the original **B2** row itself. The voice-leading and choice of chordal roots simply goes with the grain. By selectively clarifying *affinities* at every step, I have simply sought to bring this latent harmonic pathway to the fore:

²⁶⁵ See this paper, p.107.

Madame de Meuronp.8, b.68-73 - harmonic analysis - *vertical sonorities lasting a quaver or longer*

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

E A A⁶ E m⁹ G⁹ C^{11#} dim 5 D M⁷ F^{9b} F m D^b D^{b9b} A^{b11#} E^{b7#} B M B (C^b M)



Elsewhere in *Madame de Meuron*, the same 3-line version of the **B2** row is also presented without the appended three-note motifs, in prime and retrograde forms, as a 13-note row – the extra A# from the violin 1 line²⁶⁶ is retained. Since the final pitch of **B2** lies a 5th above the first pitch, the near circle-of-5^{ths} pathway can be substantially extended:

Madame de Meuron

p.44-45, b.364-373 - serial analysis

♩. = 72
364 **Row B2**

Prime, up a 5th

Prime

1 2 3 4 5 6 7 8 9 10 11 12 = 1

8th

²⁶⁶ See example, p.123, b.72.

Prime, up a further 5th

Etc. (two further cycles)

Other textural elements, omitted here, colour the picture further, but the harmonic, motivic and registral directions remain extremely clear throughout. I have employed similar sequential chains in other works, including *The Art of Thinking Clearly*. Similarly to the example given above, in both of the following excerpts, the simple stepwise movement in selected voices offers a natural opportunity for continuation:

The Art of Thinking Clearly

Dodecaphonic sequence, b.16-22, p.2.

Inversion

Inversion, down a 5th

Inversion, down a further 5th

The Art of Thinking Clearly

Dodecaphonic sequence, b.88-91, p.8.

It is hoped that the relative simplicity of these melodic shapes allows some listeners to consciously spot certain connections, not only locally, but between related passages within a larger structure. In devising such sequences, I seek to maximise motivic and harmonic transparency. On both counts, these two short passages owe technical debts to certain moments in Bartók – the motivic working throughout the final movement of *String Quartet n°6* springs to mind.²⁶⁷ Where the most basic of serial transformations – retrogrades and Schoenbergian inversions – are rendered directly audible in this way, the results can be deeply satisfying, harmony permitting.

Indeed, mathematically, like those serial mechanisms influencing chordal movement (Chapters 7 and 8), the serial mechanisms that I employ to help to shape melodic movement (this chapter) are very straightforward.²⁶⁸ At best, these provide only first approximations. The art lies in manipulating the material registrally, harmonically, motivically and rhythmically, to tease out the most musically rewarding results. Commentators such as Richard Meale have been critical of such mathematical approaches:

‘Because it seems that most composers are not well up on other matters, what they’re doing is arithmetic of a very low order and believing that, if they make an analogue with some arithmetic structure, that structure will enhance their work. And then it becomes almost voodoo when you get into that area, and I think composers today are tending to speak in a very primitive fashion about their totems.’²⁶⁹

²⁶⁷ Bartók, Béla: *String Quartet n°6* [1939], online audio (26.5.2014): <https://www.youtube.com/watch?v=6ya_J--MwZU>, 22:23-29:15.

²⁶⁸ See this paper, p.102.

²⁶⁹ Meale, Richard, quoted in Ford, Andrew: *Composer to Composer*, St Leonards: Allen & Unwin (1993), p.35.

In the various melodic excerpts from *Madame de Meuron* and *The Art of Thinking Clearly* discussed above, the final movement of Bartók's *String Quartet n°6*, the very brief excerpt from Mozart's K.271 quoted earlier²⁷⁰ and the Minuet of Schoenberg's op.25,²⁷¹ the point of having 'arithmetic of a very low order' is that such arithmetic should then be, to some extent, directly or indirectly *heard*. In melodic terms, if a serial or quasi-serial device is a) audible on some meaningful level, b) allied to good harmony, and c) sensitively and intelligently handled in all other respects – that is, provided that the composer is 'well up on other matters' – such a device should, contrary to Meale's assertion, 'enhance... [a] work.'

²⁷⁰ See this paper, p.113.

²⁷¹ See this paper, pp.114-116.

10. Polyharmonic Texture

Until now, we have examined either relatively straightforward textures, or single layers of more complex textures in isolation. Having considered harmonic movement across both successions of chords and melodic lines, we may now proceed to analyse polyharmony – that is, states where several distinct harmonic processes operate concurrently in separate textural strata. Since my harmonic approach typically seeks to combine multiple, simultaneously-sounding *Klangverwandtschaften* coherently and euphoniously, polyharmonic textures are a natural feature of my creative practice. That said, they are deployed selectively.

On the subject of polyharmony, Elliott Carter and Charles Ives are obvious points of reference. Of Carter's textural approach, David Schiff ([1983] 1998) writes:

'Carter imposed the condition of absolute polyvocalism on his music, splitting the musical materials between instruments so that *they can never speak in the same harmonic and gestural language*.'²⁷² [My italics.]

'In the Second Quartet'²⁷³... the four instruments have *different harmonies*, different tempi and different styles of playing... In the Double Concerto'²⁷⁴ each solo instrument has its own orchestra, and each orchestra has *its own repertory of harmonies*, tempos and gestures.'²⁷⁵ [My italics.]

[In *Esprit Rude/Esprit Doux* (1985)²⁷⁶ for flute and clarinet, there are] 'separate layers with *contrasting harmonies*... Each instrument has its own intervallic vocabulary. The flute plays minor thirds, major thirds, perfect fourths, minor sevenths and major sevenths; the clarinet, minor seconds, major seconds, perfect fifths, minor sixths and major sixths.'²⁷⁷ [My italics.]

Poietically, in principle, to conceive of separate textural strata as following independent harmonic courses would seem straightforward enough. But in practice, I am sceptical as to whether such an

²⁷² Schiff, David: *The Music of Elliott Carter*, London: Eulenberg ([1983] 1998), p.26.

²⁷³ Carter, Elliott: *String Quartet n°2* [1959], online audio (9.2.2017): <<https://www.youtube.com/watch?v=waQgZEGsUpw>>.

²⁷⁴ Carter, Elliott: *Double Concerto for Harpsichord and Piano with Two Chamber Orchestras* [1961], online video (6.11.2012): <<https://www.youtube.com/watch?v=seblvdCHcCE>>.

²⁷⁵ Schiff, David: op.cit. ([1983] 1998), p.26.

²⁷⁶ Carter, Elliott: *Esprit Rude/Esprit Doux* [1985], online video (7.10.2013): <https://www.youtube.com/watch?v=X_3h8CkXn-k>.

²⁷⁷ Schiff, David: op.cit. ([1983] 1998), p.46.

approach can typically – if ever – produce music in which the various layers are genuinely never *heard* to ‘speak in the same harmonic... language’. As we have seen with the Minuet of Schoenberg’s op.25,²⁷⁸ numerous fleeting harmonic *affinities* or implications will be thrown up by the vertical interaction of multiple strands, whether intentionally or otherwise. It would be unrealistic for a composer to expect that listeners will typically even attempt to suppress the instinct to hear these, let alone succeed.²⁷⁹ An elementary example: if one assigns – as in *Esprit Rude/Esprit Doux* – one set of intervals to one voice, and another set to another voice, one cannot simply consider each voice henceforth harmonically autonomous, as though there were not also a third set of intervals sounding *between* the two voices, nor a third harmonic course constructed out of the succession of those intervals.²⁸⁰ Furthermore, *a priori*, I would suggest that in most circumstances, the musical results ought to prove rather more interesting if there were, in fact, points of harmonic contact between the various layers.

I submit that in aural reality, polyharmony is a state in which, *on one level*, the various textural elements speak in different harmonic languages – to borrow a phrase from Schiff –, and *on another*, they continue to communicate between one another harmonically. Creatively, I am above all interested in the types of harmonic energy that result when two or more simultaneously-sounding harmonic pathways are made to combine and interact coherently and convincingly. A powerful chordal root in one harmonic layer cannot help but affect the balance of roots within another layer; the harmonic courses of *both* layers will each be heard very differently as a result. At times, one textural strand will take harmonic precedence over the other(s); at other times, the various strands will begin to merge. Each of these factors must be carefully managed, if the results are to be satisfying – indeed, if listener is to make any sense of the harmony at all.

²⁷⁸ See this paper, pp.114-116.

²⁷⁹ I am aware of no instance in which Carter has suggested anything to the contrary. I am questioning an implicit assumption behind the words of Schiff quoted above. Whether Carter thought of his own polyvocal harmony in precisely the same terms is another matter.

²⁸⁰ Likewise – the words are Schiff’s and not Carter’s.

Our analysis of such phenomena begins with bars 337-355 (pp.40-43) of *Madame de Meuron*. On the page, it is immediately apparent that for the first 11 bars, the separate textural strands occupy different registers. That is the default position: where there is any registral overlap, the ear will typically have a harder task in distinguishing between the layers. In terms of rhythm, gesture and pace, the distinctions between strata are also obvious. Held sonorities within given layers allow the texture to breathe; the listener's attention will switch between strands accordingly. Between bars 340 and 343 (first dotted quaver), the interlocking high register chords are foremost; one's focus then switches to the lower register voices; gradually back again over bars 346-349, and so on:

Madame de Meuron
pp.40-43, b.337-355

B - Locked, Transposed Inversions

♩ = 108

337

B2 - retrograde

B - Hall of Mirrors

B - Locked, Transposed Inversions

346

B2 - prime

B2 - prime

Over bars 340-351, the harmonic distinction between layers is also articulated gesturally, with the regularity of the upper register shapes counterbalancing greater fluidity in the lower register. Further gestural contrast and harmonic clarification are provided by a third, middle strand, proceeding more slowly than the others: the unbroken line descending from G# to a 9-bar pedal E (red). To me, it is important that gestures and harmonies work together to maximise clarity, especially in relatively dense or complex textural conditions.

As the higher textural element descends (b.349-351), the registers inevitably overlap. The result is a blurring that cannot be sustained for long: the lifting of the higher registral strand in b.351 is necessary to refocus the ear. Before that point, shared pitches – D and G – help maintain a level of harmonic coherence, and allow the two textural layers to partially fuse. With the arpeggiated gesture in b.352-353 – a registral bridge to the next section – the same principle applies: all of the pink pitches are shared with the **B2** crotchet strand. Consequently, the harmony remains clear, with the inherent intervallic consistency of the chord multiplication growing organically out of the existing texture.

Bars 108-120 (pp.17-19) of *Velvet Revolution* provide a contrasting example of polyharmony, closer in style to Carter:²⁸¹

Velvet Revolution
pp.17-19, b.108-120

♩ = 120

Row D (8-note) - AC strand **G# Mixolydian (green)**

Row C (14-note) - Prime

circle of 5ths

G# Purvi or Marva **G# Dorian**

III

Db Ab Ab⁶ Db⁶

²⁸¹ *Velvet Revolution* – audio file, 3:07-3:30.

Row **D** - AC strand
G# Phrygian (green)
G# Mixolydian or Marva - diamond heads on C and F only

114

C - Retrograde Inversion

C# M⁷

F Mixolydian

G# Aeolian/Phrygian

F Mixolydian

G# Aeolian/Phrygian

117

C# M⁷

C - Retrograde

circle of 5ths

E^b Aeolian

G#⁷

On one level, the kinds of distinctions described by Schiff would seem to apply here: *on the page*, both melodic lines possess their own, seemingly independent harmonic logic. Aurally, this is true when the two lines are played separately. When sounded simultaneously, however, despite some very clear distinctions, there are also meaningful and carefully calculated points of harmonic contact. These are crucial to the coherence and euphony of the passage. The two harmonic pathways unquestionably colour one another. Therefore, as we shall shortly confirm, within each line, one hears a different balance between roots, and thus a different progression to that which would have emerged, had the line been played in isolation.

As with the previous excerpt from *Madame de Meuron*, one strand is more harmonically mobile than the other. Here, in this respect, the differentiation is perhaps greater. The lower quaver line remains in perpetual, fairly rapid harmonic motion throughout. By contrast, in pitch-class terms, the quintuplet AC strand is ostensibly all but static. On closer inspection, within that line, simply by transposing the last four notes to a lower register at the end of both phrases (b.110 and b.117), I

alter the balance of *affinities*, with the focus shifting from G#/Ab to F#. That aside, for the most part, a clear distinction is maintained between the two rates of harmonic change, with the straight quaver strand generating most of the harmonic momentum.

Again, the two layers are separated registrally, barring occasional overlaps (blue). The 5-against-4 rhythmic division also allows the ear to differentiate between the lines – just. But in general gestural terms, in contrast to the previous example from *Madame de Meuron*, both strands here are very alike in their *moto perpetuo* angularity. Furthermore, the registral divisions within both lines render both effectively bi-vocal in themselves²⁸². At first glance, on the page, the combination of these factors appears to pose certain challenges to the ear. Indeed, in aural practice, the initial impact of b.109 is quite disorientating, since the listener has not yet had the chance to find their harmonic bearings. Those will come quickly enough, but for the duration of that bar or so, the type of discourse recalls not only some textural and gestural traits of *Le Marteau sans Maître* or certain works by Carter, but also their characteristic harmonic tangles. Once the *Klangverwandtschaften* are *untangled* – above all, when the harmonic relationship between the lower and upper strands becomes clearer – the effect is of a resolution of *cognitive* tension.

Considered independently, the quaver strand is essentially polymodal. Its first phrase is clearly anchored to a G# quasi-tonic. Its second phrase (b.114-120) moves through a succession of roots and scales, but eventually works back to G# via a simple retrograde of the first phrase. Heard in isolation, however, the balance of *affinities* is subtly different. Without the higher quintuplet line, the harmony of b.115 would have revolved around a C# root (see box), preceded by a B root (VII – I in C# nonatonic blues scale). Evidently, the same would have applied again where the same string of pitches is repeated (b.116-117).

The catalyst here is the gravitational pull of the G#/Ab, which extends to the higher quintuplet line (green pitches), providing an essential point of harmonic contact. Within bars 115 and 116-117, the

²⁸² See this paper, p.107.

G#/Ab's focal role in the higher register causes the two lower G#s to sound as roots, at the expense of the C#s. The vibraphone pedalling subtly reinforces this by lifting after each C#. Similarly, during the second half of the first phrase (b.109-110), the high and low G#/Abs reinforce one another, establishing a harmonic bond between the two textural layers. In allowing the two harmonic threads to blend, to some extent, at this point, I part company with the polyvocal Carter, and with the young Boulez of *Le Marteau*: the listener is now given a much clearer harmonic focus.

Between the two points discussed above, the influence of G#/Ab remains strong. Bars 111-113 could be heard as IV-I-I⁶-IV⁶ to a G#/Ab quasi-tonic, or else as I-V-V⁶-I⁶ in C#/Db minor, with G#/Ab as a quasi-dominant. Either way, G#/Ab retains an important hold. Over these three bars, only one pitch-class is changed from each chord to the next, securing a relative stability to balance the surrounding harmonic intricacies. Thus, G#/Ab exerts a relatively strong magnetic force throughout bars 108-117. Thereafter, we hear bars 118-119 as a *tendance*, with the G# 7th in b.120 providing a partial *repos*.

The held F# also acts as a focal pitch – indeed, within a slightly wider structural context (b.110-128, pp.17-20) the F# is more prominent.²⁸³ There are momentary points of contact or near-contact on the F# in bars 110, 112-3 and 117. However, the F# only comes to the fore as the AC line comes to rest, and the polyharmony ceases. Thus, the coherence of the passage depends, above all, on the G#'s ability to secure points of correspondence between the two distinct harmonic pathways.

In combining two or more serially independent strands within the same texture, the process of clarifying *affinities* and shaping points of harmonic contact can sometimes produce results that verge on the diatonic. Whilst the preceding example from *Velvet Revolution* qualifies as genuine polyharmony, the same is far less true of bars 402-416 (pp.49-51) of *Madame de Meuron*:

²⁸³ *Velvet Revolution* – audio file, 3:11-3:40.

Madame de Meuron

pp. 49-51, b.402-416

♩ = 108

402 A-JTri 678 A-JTri 456 A-JTri 234

6 8 7 9 E X T 2 1 4 5 3

B2 (13-note) B2 up a 5th

A-JTri 123 A-JTri ET1 A-JTri 9XE

8# 1 2 3 4 6 5 7 8 9 T E X I V

(D) (F#) A major

409 A-JTri 678 A inversion, 'Alwa' Hall of Mirrors

A-JTri 123

(8) IV VI - - I (D) (F#)

A♭ major

*'A-JTri 678' denotes: row **A**, with jumbled (i.e. re-ordered) trichords, starting from elements 6, 7 and 8. (In this case, re-ordered to 6, 8, 7).

In the higher and lower quaver strands, the continual re-orderings of trichordal portions of 12-note row **A** were carried out for two reasons: to improve the melodic shape of the row (higher line), and to clarify the harmony (lower line). My harmonic strategy was to engineer resolutions to the strongest possible chordal roots on the last of each group of three quavers (blue) – Bb minor and D major in b.402, F# major in b.403, A major and Bb in b.404, and so on. Other serial and registral factors were then manipulated to create, out of four short phrases featuring 6 separate 12-note rows, a tightly controlled melodic and harmonic arch.

The harmonic shape of row **B2** (dotted quavers)²⁸⁴ was then exploited to coincide with, and thus strengthen, certain roots from the re-ordered trichord strands. On a short-term structural level, the sustained A (purple) in b.403-404 appreciably strengthens the gravitational pull of the A major chordal root (red). Consequently, the held E (purple) in b.407-409 feels like a dominant, the D chordal root (b.409) feels like a subdominant, and the overriding impression, despite the chromatic saturation engendered by numerous 12- and 13-note rows, is of A major. Subsequently, in b.409-411, similar points of harmonic convergence are moulded to bring about a straightforward modulation to Ab major.

Past this point, the diatonicism is phased out. Unlike the held A, E and G#/Ab, the B pedal (b.411-415) never acts as a chordal root. It possesses clear *affinities* with chordal roots – D major (green) and F# major (orange) –, but does not significantly strengthen either in structural terms. The B points towards some other, unspecified harmonic destination, allowing a fragment of a polychordal Hall of Mirrors cycle to execute a clean break away from diatonic tonality.

This passage provides yet more proof that consistently pan-chromatic serialism need not preclude clear aural hierarchies, a clear sense of harmonic progression, or even plain diatonicism. Moreover, paradoxically, despite the increased textural density, the addition of successive layers of serial activity can actively *aid* overall harmonic coherence, if the composer can successfully exploit points of harmonic convergence to establish, and/or strengthen existing chordal roots. Here, this is especially true of the high and low 12-note **A-JTri** strands: their harmonic potency only materialises when both are played in combination, with the single exception of the first vibraphone phrase (b.402-403), which also makes harmonic sense in isolation. The addition of the middle **B2** strand clarifies matters further, providing a continuous harmonic thread to link the four separate phrases.

The final excerpt to be considered in this chapter intensifies such pan-chromatic saturation further still, this time with unmistakably polyharmonic results. Bars 432-443 (pp.53-55) of *Madame*

²⁸⁴ See this paper, pp.123-125.

de Meuron present an Ivesian collage, superimposing a transposed version of a previously-heard hexachordal Hall of Mirrors cycle (pp.43-44, b.354-363)²⁸⁵ onto the 12-note **A-JTri** strands featured in the previous excerpt, themselves transposed and extended:

Madame de Meuron
pp.53-55, b.432-443

♩ = 108

Hall of Mirrors

Locked, Transposed Inversions

A - JTri

(held notes omitted)

A - JTri

²⁸⁵ We have examined this cycle in Chapter 8, pp.98-99.

Both harmonic pathways were in large part separately conceived. The gaps between the 12-note phrases were varied for harmonic and contrapuntal reasons. Otherwise, the main concern was register. The Locked, Transposed Inversions in b.436-438 (blue) were shifted up a 4th, to avoid a registral clash; a single G# (x-headed) was omitted in b.440 for the same reason. The gap between the lowest two voices was kept as large as possible to aid harmonic clarity. Only four of the bass pitches form an interval smaller than an octave with the next lowest voice (brown). Three of those appear once the high-register hexachords have dropped out, allowing the bass to safely venture a little further up (b.442-443). Between the high and middle layers, registral overlaps are kept to a minimum (red).

Beyond basic safeguards such as these, however, the interaction between the two harmonic strata was left almost to chance. Curiously, to my ears at least, the seemingly haphazard superimposition of the two layers nevertheless yields a highly coherent short-term harmonic structure. In practice, I sense the lower harmonic layer more strongly, partly due to the clarity of the chordal roots occurring every three quavers (purple). In isolation, many of these chords are diatonic or near-diatonic (lowest three staves). In the higher register, since polychords, by definition, possess several roots and affinities, inevitably, some of these begin to fuse with the stronger, low-register

chordal roots, to varying degrees. Hence, to some extent, the high hexachords are perceived simply as higher partials, and/or secondary colour. In this respect only, counterpoint and stylistic considerations aside, the effect is perhaps comparable to certain sections of Claude Vivier's *Lonely Child* (1980),²⁸⁶ in which one hears one part of the texture in straightforward diatonic and modal terms, offset by a layer of high-register ring modulations and other non-tonally-conceived elements, whose harmonic course is perceived as secondary.²⁸⁷

Nevertheless, the high-register layer in this extract from *Madame de Meuron* possesses another important dimension. When heard separately in b.354-363 (pp.43-44), it forms a wholly autonomous, coherent harmonic structure in its own right.²⁸⁸ Within the substantially denser texture of b.432-443, the outline of the same grammatical structure remains perceptible, albeit in a partially concealed form. This harmonic course is especially audible in bars 436-438, where the lower layer briefly drops out twice, and the relative stasis of the Locked, Transposed Inversions stands out.

Evidently, in formulating dense polyharmonic textures of this kind, one must avoid provoking 'pitch-fatigue'.²⁸⁹ To that end, besides the local technical considerations that have formed the focus of this chapter, such passages must be embedded in the right structural contexts, to be effective. But if all of these hazards are successfully negotiated, polyharmony can generate immense structural impetus. I consider my own harmonic methods especially well-suited to this purpose. The approach to chordal spacing demonstrated in Chapters 5 and 6, together with the strategies for sustaining and controlling harmonic momentum over successions of chordal sonorities laid bare in Chapters 7 and 8, provide sufficiently robust technical foundations to successfully superimpose and channel multiple, rival layers of harmonic activity into ambitious and elaborate textures, over somewhat

²⁸⁶ Vivier, Claude: *Lonely Child* [1980], online audio (18.7.2012): <<https://www.youtube.com/watch?v=KhDjUzapdgg>>, 5:15-18:43.

²⁸⁷ See Gilmore, Bob: 'On Claude Vivier's "Lonely Child"', in *Tempo*, vol.61, n°239 (January 2007), pp.5-15; above all p.12.

²⁸⁸ See this paper, pp.98-99.

²⁸⁹ Gerhard, Roberto, quoted in Keller, Hans: op.cit. (1969), p.9. Also quoted in Gilmore, Bob: op.cit. ([2014] 2015). [Online: no page breaks or numbers.] See this paper, pp.87-88.

sustained stretches, without losing the sense of harmonic purpose or tiring the listener. Several passages in both *Velvet Revolution* and *Madame de Meuron* demonstrate this – especially the climactic sections of both. The same is true of parts of *Nine Dragons*.²⁹⁰ The energy produced within these sections is of course rhythmic, contrapuntal, gestural, textural and timbral – but it is above all harmonic. If the harmony did not work, neither could these textures.

²⁹⁰ Above all, pp.16-20, b.86-106. This passage provides another illustration of the diatonic/non-diatonic ‘Vivier effect’ described above.

11. The Longer Term: ‘Fetish Notes’, Quasi-Tonics, Endings

‘It’s something in the way I hear all music, actually, this idea of there being a single note – a particular pitch on a particular instrument – that has a crucial function across whole structures... It’s the idea of a fetish note in a piece: that certain specific pitches become fetish objects, which are returned to and rubbed by the composer all the time... You see it everywhere: in Beethoven or Mozart, Haydn or Chopin: there will be a note that will be a fulcral point for whole pieces. And often it won’t be the tonic... These fetish notes will often become an enharmonic point in the piece, a place where one kind of harmony can transform through a sleight of hand into another sort of harmonic area. But in order to do that, the note has to mean both things, to work in both harmonic worlds... Whole symphonies are built around this: it’s the grit in the oyster.’²⁹¹

Despite a number of divergences, something approaching the ‘fetish note’ that Thomas Adès describes also features in my own compositional practice. Above all, Adès’s assertion that a note serving as a ‘fulcral point’ is not automatically – or even ordinarily – ‘the tonic’ resonates strongly with my own thinking. This stands in contrast to what might perhaps be interpreted as an implicit assumption, in Julian Anderson’s nonetheless highly informative writing on Knussen, that any ‘pitch [that] starts to assume the function of a focal point’ *could only ever constitute* a ‘recognizable modal tonic’.²⁹²

Wolfgang Rihm’s *IN-SCHRIFT* (1995) provides a clear counterexample. The work begins with an extended unison on F#. ²⁹³ The same pitch continues to occupy a prominent role throughout much of *IN-SCHRIFT*, colouring our perception of numerous harmonies, including the A minor episode briefly discussed in Chapters 1 and 3 of this paper. ²⁹⁴ It is certainly a ‘focal point’. But in a context where, A minor aside, chordal roots are few and far between, ²⁹⁵ at no point does the pervasive, conspicuous F# serve as a harmonic *repos*. Unlike the A in Knussen’s *Flourish with Fireworks* (1988, rev. 1993) to

²⁹¹ Adès, Thomas, in Adès, Thomas and Service, Tom: *Thomas Adès: Full of Noises*, London: Faber and Faber (2012), pp.48-49.

²⁹² Anderson, Julian: ‘Harmonic Practices in Oliver Knussen’s Music since 1988: Part I’ in *Tempo*, n°221 (Jul.2002), p.4. See also this paper, p.93. Whilst Anderson’s wording would seem to suggest a conflation of the two phenomena, this might not have been intentional.

²⁹³ Rihm, Wolfgang: *IN-SCHRIFT* [1995], online video (29.11.2013): <<https://www.youtube.com/watch?v=i62K43AI4ro>>, 0:00-0:46.

²⁹⁴ See this paper, pp.8 and 28-30.

²⁹⁵ See this paper, pp.28-30.

which Anderson's remarks pertain,²⁹⁶ the F#'s harmonic magnetism is not sufficiently strong for the label 'tonic' – or 'quasi-tonic' – to apply. It is a clear-cut, highly effective 'fetish note'.

Likewise, in my music, certain pitches fulfil vital structural roles, without necessarily acting as tonics or quasi-tonics, or even roots.²⁹⁹ I frequently present such notes as pedals – but not all pedal notes are 'fetish notes', by any means. These pitches invariably mean several things in several 'harmonic worlds'; they serve as links between these various worlds.

The divergences between Adès's statements and my music are as follows. Firstly, I do not necessarily tie 'fetish notes' to a single instrument: for me, timbral consistency can be useful, but remains only one of several valid options. Secondly, in my practice, there may be more than one long-term 'fetish note'. In a pantonally-conceived context³⁰⁰ where there is no single Schenkerian tonic or quasi-tonic governing the entire structure – no single, unifying harmonic truth –, to present a single recurring pitch as a vehicle channelling all tensions or ambiguities might not always suit the piece. In some circumstances, such a move would seem facile and incongruous. On the other hand, having *two or three* 'fetish notes' serve as long-term 'fulcral points' – but probably no more than that – can help to crystallise and clarify a complex harmonic argument, tying up certain loose ends, without purporting to encapsulate each and every important harmonic question in a single recurring note, still less suggest that all matters could subsequently be resolved at a single stroke. Thirdly and

²⁹⁶ Arguably, even the A in *Flourish with Fireworks* perhaps does not form as strong a 'modal tonic' as Anderson suggests. Unquestionably, unlike Rihm's F#, Knussen's A serves as a chordal root on plenty of occasions. But much depends on how one perceives the opening bars.²⁹⁷ Anderson clearly hears the opening pentachord (A-D#-E-G-B) as Chord I₇⁹. However, in conjunction with the first chord change – *almost* to a French 6th –, the 7th (G) perhaps carries a hint of *tendance*; that is, a hint of V₇⁹.²⁹⁸

I advance this point with some hesitation. It amounts to no more than a quibble; one might argue the case either way. My wider point, echoing Adès, is that the mere presence of a single 'fulcral' pitch does not automatically establish a tonic or quasi-tonic, *even in cases such as this, where the pitch in question clearly operates as a chordal root*.

²⁹⁷ Knussen, Oliver: *Flourish with Fireworks*, op.22 [1988, revised 1993], online audio (28.8.2015): <<https://www.youtube.com/watch?v=wUQaR03xFp0>>, 0:00-0:30.

²⁹⁸ Knussen, Oliver: *Flourish with Fireworks*, op.22 (1988, revised 1993), London: Faber (1994), pp.1-2, b.1-11 and beyond. The second chord (b.4) comprises Bb–D#–E–G#. Substitute D for D#, and we have a French 6th. In a Mozartian idiom, Bb–D–E–G#, preceded and succeeded by A⁷, points to D major or minor.

²⁹⁹ We have already encountered examples – see this paper, pp.97-98 and 109-110.

³⁰⁰ See this paper, pp.10-13.

finally, in my music, certain pitches serve as essential points of contact between harmonic worlds, but do so only on a short-term or medium-term structural level.

Through the final stages of *Velvet Revolution* (b.273-321, pp.43-52), middle C amounts to a medium-term 'fetish note' with long-term *retrospective* structural significance.³⁰¹ Earlier in the piece, there are numerous examples of other notes serving as localised harmonic fulcra. Some of these are the product of serial mechanisms such as Chords of Locked, Transposed Inversion (b.41-56, pp.7-9)³⁰² or Stravinsky/Krenek rotations (b.63-96, pp.10-15).³⁰³ But after a short time, such pitches almost invariably cede to other focal pitches or reference pitches. Indeed, often, two or three reference pitches operate simultaneously. The C constitutes the only instance within *Velvet Revolution* where a single note maintains such a role, essentially unchallenged, for a substantial stretch. That said, there are several lesser precursors to it. These include an extended F#, heard mainly in the horn, rivalled by a G# from bars 108 to 120 (pp.17-19),³⁰⁴ but unchallenged from bars 121 to 128 (pp.19-20).³⁰⁵ There is also a C# (b.135-144, pp.21-23),³⁰⁶ again mainly in the horn, itself echoing the F#. The later, fulcral middle C is also sounded at times by the horn, and at times paired with similar material to the earlier F#. Besides the F# and C#, the late C perhaps also recalls a few earlier middle Cs: pp.2, 4 and 30-31.

Coming substantially after the climax (b.178, p.29), from p.43 onwards, middle C fulfils a stabilising role, helping to progressively ease the piece towards its conclusion. Never serving as a chordal root, it straddles a succession of contrasting harmonies and textures, through several shifts into successively slower tempi. Since middle C is the only pedal note to appear over a considerable stretch, the single pedal G# that momentarily breaks the spell towards the very end of the piece

³⁰¹ *Velvet Revolution* – audio file, 7:25-9:20.

³⁰² 1:06-1:36.

³⁰³ 1:49-2:48.

³⁰⁴ 3:07-3:30. See this paper, pp.132-135.

³⁰⁵ 3:30-3:39.

³⁰⁶ 3:52-4:03.

(b.311-315, pp.50-51)³⁰⁷ demands to resolve to back the C – in effect, simply reinforcing it. In relation to the G#, the C clearly serves as a harmonic *repos*. In the longer term, the same pitch essentially serves as a structural *repos*. And yet, in relation to the trichordal quaver gestures in b.319-321, the C cannot possibly constitute a tonic or quasi-tonic.³⁰⁸

Velvet Revolution

pp.51-52, b.313-321

♩ = 112

313

317

That is, the final C resolves certain harmonic questions, whilst leaving others open. This seemed to me the most authentic way to end a piece featuring so many diverse harmonic threads. Indeed, many of my endings follow a similar guiding principle.

³⁰⁷ 8:47-8:58.

³⁰⁸ 8:50-9:20.

The Art of Thinking Clearly employs two long-term ‘fetish notes’ – B and D. As previously observed, the B operates as a quasi-tonic during two closely-related pentachordal and trichordal Hall of Mirrors cycles, which – solely in harmonic terms – are genuinely comparable to a Sonata Form Exposition and Recapitulation.³⁰⁹ The B’s role thus approaches that of a long-term structural tonic. But initially, throughout bars 1-50 (pp.1-4), we hear it only as a recurring ‘fetish note’. The first indication of a potential quasi-tonic status must wait until the B’s first appearance as a chordal root in b.51 (p.4). Unequivocal confirmation of this ensues in the last beat of b.55 (p.5), at the end of the first phrase of the pentachordal Hall of Mirrors cycle. In b.102-109 (pp.9-10) and b.365-372 (pp.27-28), the B serves again as a ‘fetish note’, but on these occasions not as a root, nor as a quasi-tonic. Hence, the B’s long-term structural status is only fully established through the trichordal Hall of Mirrors cycle (b.386-408, pp.28-30).

Here, following the work’s climactic section, the B serves to stabilise, somewhat like the middle C at a corresponding structural point in *Velvet Revolution*. And yet there is a crucial distinction. To end *The Art of Thinking Clearly* at b.408, or else with another gesture more firmly anchored to B, would have been false. Both works pose numerous harmonic questions; I consider it generally best to end such a piece with something that does not purport to provide a definitive answer. The C in *Velvet Revolution*, despite its stabilising structural role, retains a suitably enigmatic quality. By contrast, the B in *The Art of Thinking Clearly* provides too much harmonic certainty.

The piece’s other structural ‘fetish note’, a D, serves to set up a solution. Formerly, the same D had merely operated as a localised reference pitch between bars 187 and 204 (pp.13-14). When the same section is repeated, wholesale, in the final two pages, the D acts an essential harmonic diversion from the B quasi-tonic. The reference back to pp.13-14 is secondary. The D gains further structural significance on a gestural level, since the dodecaphonic flourishes leading into each D (b.410, 423-4 and 436; pp.30-31) recall very similar figures setting up B in the opening section (b.1,

³⁰⁹ See this paper, pp.79-83.

13, 46; pp.1-4). The registral proximity of the two pitches also seems to pair them together. Thus, in non-harmonic terms, the D mimics the B, acting as a substitute for it.

However, having never previously operated as a root, nor even featured as part of a chord in its ‘fetish note’ guise, the precise harmonic significance of the D remains elusive, other than as a structurally imperative diversion. Just as the B’s true harmonic role only begins to materialise from b.51, when it is heard for the first time as the root of a chord, the D’s harmonic position is only revealed at the very end of the piece, when it too finally forms part of a chord (b.439-441, p.31). The distinctive low A root at this point provides the necessary twist. Having featured twice in the run-up (b.426-428 and 432-435, pp.30-31), the A can also now be considered a localised focal pitch in conjunction with the D: it has not come from nowhere. It solves the riddle of the D, but provides no harmonic answers to the rest of the piece – achieving a satisfying *repos* on one level, whilst steering clear of false certainties.

The final pages of *Nevermore*, previously analysed in Chapter 8 as an example of harmonic prolongation,³¹⁰ address some comparable long-term harmonic questions – in so far as ‘long-term’ can apply to a work lasting under 5 minutes. Given the central role of melody in *Nevermore*, the transparency of its melodic design and the work’s brevity, the following melodic reduction may serve as a shorthand guide to the entire structure:

Nevermore
Melodic Reduction

The melodic reduction is presented on a single staff across two lines. It consists of five numbered sections: i. (bars 0-8), ii. (bars 24-27), iii. (bars 34-41), iv. (bars 57-86), and v. (bars 89-105). Above the staff, three boxes are labeled 'Boulez 1' (covering sections i and ii), 'Boulez 2' (covering section iii), and 'Boulez 3' (covering section iv). The notation includes various accidentals (sharps, flats, naturals) and note heads. Some notes are highlighted in different colors: red (e.g., bar 0, 24, 34, 57, 67, 89), green (e.g., bar 8, 27, 72, 86), blue (bar 105), and purple (bar 59). Slurs and brackets are used to group notes and indicate phrasing or melodic arcs across sections.

³¹⁰ See this paper, pp.108-110.

The image displays two staves of musical notation for the piece 'Nevermore'. The top staff covers measures 109 to 135, with a boxed section from 109 to 116. Below this staff, brown brackets indicate ascending melodic chains: chain 'vi.' from measure 120 to 127, and chain 'vii.' from measure 127 to 135. The bottom staff covers measures 136 to 182, with a boxed section labeled 'Boulez 4' from measure 146 to 155. Below this staff, brown brackets indicate descending melodic chains: chain 'viii.' from measure 136 to 142, chain 'ix.' from measure 146 to 155, and chain 'x.' from measure 162 to 182. Specific notes are highlighted with colored dots: red for E, purple for F, and green for G#.

Of course, since this summary ignores chordal roots, it does not chart the course of the harmony.

But by condensing the melodic shapes, it helps to highlight certain essential structural features.

Leaving aside four of the five episodes in boxes, the overall melodic shape of *Nevermore* is very straightforward: seven ascending chains (brown brackets) up to the work's climax (b.135, p.12), followed by three descending chains (counting 'Boulez 4'). Of the ascending chains, two begin with E (red), two with F (red) and two with G# (purple). I hear these as the work's three 'fetish pitches'. Together with the F# initiating chain *vii* (b.127, p.11), one can identify a 'fetish' register: all four lie within a major 3rd in the low range of the flute. But within that register, E, F and G# serve distinct harmonic and structural purposes.

E serves as a long-term quasi-tonic. In the opening pages, the combined influence of b.0-3 and b.24-26 (p.2)³¹¹ ensures that of the various transpositions of the diatonic resolution of a Boulez chord, the E major cadence (b.35-37, p.3)³¹² forms a conspicuous structural anchor. At b.40, we expect another plagal resolution to E that never arrives. The extended pedal in bars 67-78 (pp.5-6) confirms the pre-eminence of E – although once again, the expected resolution is never forthcoming.³¹³

³¹¹ *Nevermore* – audio file, 0:00-0:07 and 0:47-0:53.

³¹² 1:07-1:17.

³¹³ 2:16-2:39.

The F ‘fetish note’ shadows the quasi-tonic E, without ever taking on the same harmonic role – a comparable relationship to that between D and B in *The Art of Thinking Clearly*. In bars 41-43 (p.3) and 89-91 (p.7) – F plays two key structural roles.³¹⁴ The first is to initiate new harmonic and melodic chains. The second is to provide a means of referring back to the opening bars in gestural, registral and even timbral terms, whilst avoiding a return to the quasi-tonic E: to do so at either point would have wholly spoiled the harmonic flow and structure. In other words, the flute’s low F acts as a substitute for its low E in all respects other than harmony: at neither point does the F serve even as a chordal root. Likewise, the recurring high Fs (pink) in b.102-111 (pp.8-9) provide a short-term focal point, but never sound as roots³¹⁵ – in stark contrast to the high E (pink) in b.34-37 (p.3).

The main structural function of the pedal G# in b.162-171 (pp.14-15),³¹⁶ analysed in Chapter 8, is to stabilise the harmony, following the work’s climax (b.135, p.12). In that respect, it recalls the middle C in *Velvet Revolution*, and both the B and D ‘fetish notes’ from the closing pages of *The Art of Thinking Clearly* (b.386-441, pp.28-31). The G#s in b.60 (p.5) and b.120 (p.10) of *Nevermore*, besides triggering new melodic chains on a local level, foreshadow the more prolonged G# of b.162-171: all three support AC strands. The aural correspondences are readily apparent.

But like the late D in *The Art of Thinking Clearly*, the long, late G# in *Nevermore* is too ambiguous provide a satisfying final point of structural *repos*. Likewise, a long-delayed resolution to E would have felt contrived at this stage: that harmonic question must remain unanswered. The solution is, once more, to turn to F as a substitute for E. Having not featured prominently in this register since b.91, the final F feels fresh. It constitutes a *repos* from certain angles, but not others. It clearly refers back to the opening, and to other crucial points over the opening pages – b.41 and b.89. However, it neither sounds as a chordal root during b.182-186 (p.15), nor resolves the E question.³¹⁷ Moreover,

³¹⁴ 1:25-1:31 and 2:55-3:00.

³¹⁵ 3:18-3:34.

³¹⁶ 5:15-5:38.

³¹⁷ 5:58-6:08.

throughout the work, we hear F as subordinate to E. Hence, it offers the right balance between certainty and uncertainty.

The closing pages of *Madame de Meuron* take a broadly similar course to the corresponding sections of *Nevermore* and *The Art of Thinking Clearly*: a stabilising pedal note, followed by a diversion. However, in some respects, the pedal B lasting from bars 634 to 652 (pp.81-83) of *Madame de Meuron* operates differently. It refers back to the work's climax, where it had served as the root of the central chord – b.480-481 (p.60) and b.487-490 (pp.61-62). But unlike most of the focal pitches examined earlier in this chapter, in the context of a 20-minute work, the B does not constitute a long-term 'fetish note'. Another distinctive attribute of the B is its extreme registral position, which, besides setting it apart from other focal pitches elsewhere in the work, accords it a formidable harmonic influence. Quite simply, within the rapidly shifting, pan-chromatic Hall of Mirrors cycles from b.636-648 (pp.81-82), given my essentially polychordal approach to spacing, any tones possessing *affinity* with the B will inevitably reinforce it as a root. Thus, it acts as a powerful short-term quasi-tonic.

Other than the pedal B, the material in this passage recapitulates an earlier section of the work (b.54-73, pp.6-8), almost unchanged. That said, the gravitational pull of the B singlehandedly transforms our perception of the entire harmonic circuit. As a direct consequence, one chord from the original passage (below, in red) was removed from the recapitulation. In conjunction with the low B, the diatonic implications of this chord would have provided too strong a cadential confirmation of the B – essentially V^6-I^6 in B major:

Madame de Meuron
pp.6-7, b.54-63





For a similar reason, shortly before the rising string phrase reaches a high B, the low B is finally lifted (b.652-653, p.83). The same principle governs the subsequent diversion towards other harmonic ground: namely, the avoidance of false harmonic certainties.

All of the features described above fundamentally depend on secure handling of chordal roots in all contexts. In deploying the 4,096 without clear roots, or true control over progressions of roots, one loses the ability to generate quasi-tonics. Granted, under such conditions, one might nevertheless, through sheer repetition, obtain a ‘fetish note’ such as the F# in Rihm’s *IN-SCHRIFT* (1995). But without chordal roots, the crucial grammatical distinctions between E, F and G# in *Nevermore*, between B and D in *The Art of Thinking Clearly*, and many more, would not have been possible. In *IN-SCHRIFT*, Rihm nonetheless achieves a comparable gradation via *post-tonal* means: evidently, the interpolation of an A minor episode furnishes chordal roots. A *pantonal* stance, however, potentially allows far more comprehensive control over this aspect, covering the full 4,096.

As Adès (2012) notes,³¹⁸ entire musical structures hinge on successive ‘subtle gradations of harmony’³¹⁹ of this kind.

³¹⁸ See this paper, p.142.

³¹⁹ Taruskin, Richard: ‘How Talented Composers Become Useless’ [1996] in *The Danger of Music*, Berkeley and Los Angeles: University of California Press (2008), p.88. See this paper, pp.101-102.

12. The Pantonal Stance

‘Our presentation was... careful not to picture atonality as a negligible or inartistic movement. For not only was it the evolutionary purpose of atonality, paradoxical as it may appear, to prepare pantonality, but finally even to become a part of it, although atonality may in this process have to forfeit some of its own nature. And this refers not only to atonality as a specific principle but to all its technical components.’³²⁰

‘Pantonality... can of its nature embrace any atonal expression and can make it a part of its own planetary system of multiple tonalities. Indeed, as a state of fluctuating tonical relationships, pantonality can endow atonal shapes with a new meaning, make new melodic types into new melodies, [and] new harmonic combinations into new harmonies.’³²¹

Rudolph Reti wrote the words quoted above in the mid-1950s; the first publication of *Tonality, Atonality, Pantonality* appeared posthumously in 1958. Reti’s assessment of ‘atonality’ as a transitional stage in preparing ‘pantonality’ was founded both on misinterpretations of past musical developments³²² and on unsubstantiated, utopian assumptions concerning future developments. For one thing, evidently, sixty years on, a great deal of music is still being written that Reti would have classed as ‘atonal’ – hardly the mark of a movement whose ‘evolutional purpose’ ‘was’ purely to prepare the ground for ‘pantonality’. Further, as will shortly be demonstrated, the technical basis on which Reti argues that ‘atonality’ can become part of ‘pantonality’ is open to question. Further still, Reti’s is only one of three rival definitions of ‘pantonality’, none of which proves altogether watertight on its own terms. We shall consider all three in due course.

And yet, on a more general level, Reti’s intuition was correct, in that – as we have seen – a broadly pantonal approach, Retian or otherwise, *can* be successfully applied to any ostensibly ‘atonal’ pitch-class material within the 4,096. This is, of course, the fundamental premise behind my harmonic methods. The technical means via which I have sought to accomplish this can be roughly summarised as follows:

³²⁰ Reti, Rudolph: *Tonality, Atonality, Pantonality*, London: Rockliff (1958), p.126.

³²¹ Ibid., p.111.

³²² Hans Keller has made a similar point, albeit only in passing. See Keller, Hans: Review of *Tonality, Atonality, Pantonality* by Rudolph Reti, in *Tempo*, n°50 (Winter 1959), p.31 (top).

- a) Consistently clarifying *Klangverwandtschaften* and chordal roots, through a polychordal approach to register.
- b) Establishing both local and long-term reference pitches, in the form of both quasi-tonics and ‘fetish notes’.
- c) Conscious control over levels of sensory dissonance, for both aesthetic and grammatical purposes, again through chordal spacing.
- d) A concern for *tendance* and *repos*.

If one takes Reti’s criteria at face value, my music frequently achieves ‘the characteristic attribute of pantonality... that is, a structural state in which several [quasi-]tonics exert their gravitational pull simultaneously’.³²³ However, upon closer scrutiny, difficulties arise. I hold that one source of these lies in Reti’s conception of a ‘melodic tonality’,³²⁴ which even in a straightforward modal context leads him to conclude: ‘any note of the tune can be made to become a... [melodic] tonic, merely by accentuating it, dwelling on it, that is, by an appropriate phrasing.’³²⁵ Reti’s notion of a ‘melodic tonic’ encompasses many pitches that I would not consider tonics or even quasi-tonics. In practice, some are merely relatively consequential pitches within a given melodic or contrapuntal line. Others are local or long-term ‘fetish notes’. Others still are chordal roots. Moreover, many of Reti’s harmonic analyses obfuscate matters further by failing to specify whether the ‘tonics’ in question are ‘melodic’, ‘harmonic’, or both. All of this would seem to cast doubt on the validity of the fundamental premise behind Retian ‘pantonality’: *a priori*, when the meaning of the term ‘tonic’ is eroded to the point of including almost any relatively conspicuous pitch, the claim that several such pitches ‘exert their gravitational pull simultaneously’ would seem to verge on unfalsifiable.

Yet *a posteriori*, once one considers Reti’s musical analyses yet more closely, a more nuanced picture emerges. Reti dissects a wide variety of musical examples – some tonal, some ‘atonal’, some

³²³ Reti, Rudolph: op.cit. (1958), p.67. See this paper, p.10, for a fuller version of the same quote.

³²⁴ Ibid., pp.15-30.

³²⁵ Ibid., pp.23 and 133 (Example 1a).

demonstrating ‘trends toward pantonality’,³²⁶ and some ‘pantonal’. Only three excerpts are explicitly identified as belonging to this last category: one by Reti himself – part of *The Dead Mourn the Living* from *The Magic Gate*³²⁷ –, one from Ives’s *Concord Sonata* (1915)³²⁸ and one from Bartók’s *Music for Strings, Percussion and Celesta* (1936).³²⁹

In the first of these extracts,³³⁰ Reti considers that there are four such ‘tonics’: C#, D, A and ‘B or E’.³³¹ By contrast, I can hear no single pitch exerting sufficient magnetic pull to justify the term ‘tonic’. I do, however, perceive the simultaneous interaction of multiple *Klangverwandtschaften*. That is, I hear not multiple, concurrent ‘tonics’ but multiple, concurrent *chordal roots*. Indeed, Reti describes ‘a kind of consonant relationship’³³² between certain elements, through which ‘they... blend into one unit’.³³³ Given that the pitches to which Reti refers form sensory dissonances, it would seem that *Klangverwandtschaft* is in fact the term for which he is searching.³³⁴ This is not an incidental feature of his analysis, but ‘a point of fundamental importance’:³³⁵ to Reti, this ‘blending of several tonically based ideas’³³⁶ is what sets his conception of ‘pantonality’ apart from polytonality, which he hears not as a ‘blending’ but as a ‘clash of keys’.³³⁷

In the extract from Bartók’s *Music for Strings, Percussion and Celesta* (1936),³³⁸ Reti identifies F# as the ‘foremost tonic’,³³⁹ implying – not stating – that any of C, C#, E, F and B might perhaps also constitute ‘tonics’.³⁴⁰ Once again, like Reti, I hear several interconnected harmonic currents. But

³²⁶ Ibid., p.98.

³²⁷ Ibid., pp.62-63 and 159.

³²⁸ Ibid., pp.63-65 and 149-150.

³²⁹ Ibid., pp.73-74 and 142-143.

³³⁰ Reti, Rudolph: *The Magic Gate* [date of composition unknown], New York: Boude Brothers (1957). At the time of writing, I do not have access to a recording, and am working solely from the extract printed in *Tonality, Atonality, Pantonality*, p.159.

³³¹ Reti, Rudolph: op.cit. (1958), pp.62-63.

³³² Ibid., p.63.

³³³ Ibid., p.63.

³³⁴ See this paper, pp.20-23.

³³⁵ Reti, Rudolph: op.cit. (1958), p.63.

³³⁶ Ibid., p.62.

³³⁷ Ibid., p.62.

³³⁸ Bartók, Béla: *Music for Strings, Percussion and Celesta* [1936], online audio (18.1.2012): <<https://www.youtube.com/watch?v=ZFTGdFuUdAU>>, 15:24-16:41.

³³⁹ Reti, Rudolph: op.cit. (1958), p.74.

³⁴⁰ Ibid., pp.73-74 and 142-143.

among these, I perceive only one true tonic – C. In this respect, my harmonic hearing not only opposes that of Reti, but Bartók's enharmonic spelling: where Bartók writes A#s and F double sharps, suggesting an F# or C# tonality, I cannot help but hear closer *Klangverwandschaft* with the pedal C in the timpani – that is, I hear Bbs and Gs respectively.³⁴¹

The extract from Ives's *Concord Sonata* (1915)³⁴² is reproduced below. Reti designates A, B, C and possibly D³⁴³ as 'tonics' and 'quasi-tonics'.³⁴⁴ Of these, I hear A as a 'fetish note' and B as a chordal root. But in this instance, I too hear several tonics: C, Db and Bb. Curiously, Reti makes no mention of the latter two. Reti may have heard the harmonies in 'bars'³⁴⁵ 3-9 as polytonal clashes rather than 'pantonal' blends. Nonetheless, Reti's preoccupation with a 'bitonality'³⁴⁶ between A and C below would seem odd, given that he passes over a far more plausible *bitonality* without comment:

Ives, Charles: *Second Pianoforte Sonata: "Concord, Mass., 1840-60"* [1915]
New York: Knickerbocker Press (1921).

IV. "Thoreau", p.70.

KEY:

1. Blue text denotes observations by Reti with which I essentially agree.
2. Red text denotes observations by Reti with which I disagree.
3. Green text denotes notable omissions from Reti's analysis.

1

Db major

Bb major/minor (upper 3 voices)

C major' - p.64.

'C and A as over-all tonics' - p.65

³⁴¹ Bartók, Béla: *Music for Strings, Percussion and Celesta* [1936], Vienna: Universal Edition – UE 10808 (1937), pp.66-67, b.1-13.

³⁴² Ives, Charles: *Second Piano Sonata "Concord, Mass., 1840-60"* [1915], online audio (20.8.2013): <<https://www.youtube.com/watch?v=cDNPPsUaVYo>>, 45:53-47:30.

³⁴³ Reti, Rudolph: op.cit. (1958), pp.64-65.

³⁴⁴ Ibid., p.64.

³⁴⁵ Ives's score features very few barlines. In the example reproduced here, I have added time signatures and bars, purely in the interests of analytical clarity. I have also altered some accidentals, to better reflect my hearing of the harmony.

³⁴⁶ Reti, Rudolph: op.cit. (1958), p.64.

modulation

C/ A major/ Eb major polychord

'atonal phrase' p.64

(8)-----

Reti. *

'Intermediary dominant' preparing 'D minor' (p.64). If so, the previous 'phrase' cannot be 'atonal'.

'D minor' [sic] p.64

'A kind of B minor' p.64

'atonal phrase' p.65

(8)-----

'G... as a root' - p.64.

Reti. *

Thus, from among the three illustrative examples provided by Reti, I contend that only one seven-bar stretch genuinely exhibits the ostensible defining feature of his conception of 'pantonicity' – the 'structural state in which several tonics exert their gravitational pull simultaneously'.³⁴⁷ Unless, that is, one accepts a definition of 'tonic' so inclusive as to verge on meaningless. Moreover, that single seven-bar episode amounts to a straightforward case of polytonality. However, if one discards the concept of 'melodic tonality' and reads Reti's analyses as attempts to describe interactions between multiple, concurrent chordal roots and *affinities*, the music broadly substantiates his theories, and the term 'pantonal' no longer seems superfluous or misleading. Music featuring two or more simultaneous, clearly-defined diatonic tonalities may be considered *polytonal*. I tentatively advance

³⁴⁷ Ibid., p.67. See this paper, pp.10 and 153.

that music which likewise features several interwoven harmonic threads, but handles these in a more open-ended manner, suggesting various coexisting diatonic or modal areas, *mostly without establishing true tonics*, may be considered ‘*pantonal*’ in something close to the Retian sense.

We may now consider Reti’s claim that such an approach to harmony ‘can of its nature embrace any atonal expression’.³⁴⁸ Of the excerpt from *Concord Sonata* quoted above, Reti considers that much of ‘the material... is in its detail atonal, indeed truly atonal, not merely tonal spiced with discords’.³⁴⁹ In practice, this is not the case. First: the melodic outline of ‘bars’ 3-9 is quirky but essentially diatonic, ‘spiced with discords’ in the form of polychords. Second: given that Reti acknowledges that the C# in ‘bar’ 13 is heard as the 3rd of the low A, and given that the arpeggiated figure in ‘bar’ 12 is evidently a polychord, his assertion that ‘bar’ 12 features an ‘atonal phrase’³⁵⁰ is unconvincing. Only the very last melodic figure (‘bars’ 15-16) can veritably be heard as ‘atonal’ in the sense intended by Reti. Even then, under certain performance conditions, perhaps the final C# could be heard as the 7th of D. Reti’s exaggerations of the frequency of ‘atonal’ chords and figurations are not confined to this excerpt but recur in other musical analyses, including that of the Bartók extract discussed above.

By contrast, my scores demonstrate that a broadly ‘pantonal’ approach is fully compatible, in pitch-class terms, with any ‘of the melodic figurations and chordal combinations of atonality’,³⁵¹ and in that sense with ‘any atonal expression’ – that is, *with any of the 4,096*.³⁵² They do so using an array of harmonic techniques that extend well beyond the bounds of Reti’s musical universe, but that is only to be expected, given musical developments over the last sixty years.

The theoretical foundations of Retian pantonality are not altogether secure. Taken at face value, Reti’s musical dissections do not altogether validate his central claims. Hans Keller’s allusion to the

³⁴⁸ Ibid., p.111. See this paper, p.152.

³⁴⁹ Ibid., p.65.

³⁵⁰ Ibid., p.64.

³⁵¹ Ibid., pp.9-10.

³⁵² See also this paper, pp.10-11.

‘characteristic naivety’³⁵³ of much of Reti’s reasoning would seem apt. It is perhaps no surprise, then, that neither the term nor the concept have since gained a wider currency. Yet Reti began to articulate certain insights which resonate strongly with my own thinking and compositional practice – insights that I have not found in the work of any other author.

His was neither the first, nor the only noteworthy definition of ‘pantonicity’. William Drabkin (2001),³⁵⁴ Norton Dudeque (2005)³⁵⁵ and others erroneously claim that the term was coined by Reti. Keller (1959)³⁵⁶ and Arnold Whittall (2008),³⁵⁷ however, correctly identify that the term originates with Schoenberg. Dudeque considers Schoenberg’s use of the term to have stemmed from a ‘misunderstanding’³⁵⁸ of Reti. Keller, however, considers Reti’s use of the term an ‘inaccurate, uninformed and misleading... unconscious appropriation’³⁵⁹ of Schoenberg’s definition. Schoenberg’s first use of the term ‘pantonal’ dates from 1921³⁶⁰ – well over 30 years before Reti’s book. In fact, Reti acknowledges that there have been precedents:

‘If, moreover, we suggest *pantonicity* as a linguistic symbol for this new concept, we do it with some hesitation, for pantonicity has appeared sporadically in some treatises as a term, even though used there in a vague, casual way, without any concrete meaning to it.’³⁶¹

The dismissive tone and lack of specific reference do not do justice to Schoenberg’s distinct use of the term. Like that of Reti, Schoenberg’s definition is insightful in some respects, and flawed in others. Most pertinently to our discussion, in its reference to overtones, Schoenberg’s vision *also* foreshadows a central feature of my harmonic approach:

³⁵³ Keller, Hans: op.cit. (1959), p.31.

³⁵⁴ Drabkin, William: ‘Pantonicity’ in *The New Grove Dictionary of Music and Musicians, Volume 19*, ed. Stanley Sadie and John Tyrell, London: MacMillan, ([1980] 2001), p.45.

³⁵⁵ Dudeque, Norton: *Music, Theory and Analysis in the Writings of Arnold Schoenberg*, Aldershot and Burlington: Ashgate (2005), p.116.

³⁵⁶ Keller, Hans: op.cit. (1959), pp.30-31.

³⁵⁷ Whittall, Arnold: *Serialism*, Cambridge: Cambridge University Press (2008), p.275 and elsewhere.

³⁵⁸ Dudeque, Norton: op.cit. (2005), p.116.

³⁵⁹ Keller, Hans: op.cit. (1959), p.31.

³⁶⁰ Schoenberg, Arnold, transl. Roy E. Carter: *Theory of Harmony*, Berkeley and Los Angeles: University of California Press, ([1911] 1983), p.432. NB: the footnote featuring the term ‘pantonal’ first appeared in the third, revised edition of 1922. The revisions were made in 1921.

³⁶¹ Reti, Rudolph: op.cit. (1958), p.4.

'I... have a hope that in a few decades audiences will recognize the *tonality* of this music today called *atonal*... Indeed, tonal is perhaps nothing else than what is understood *today* and atonal what will be understood in the *future*. In my *Harmony* treatise³⁶² I have recommended that we give the term "pantonal" to what is called atonal. By this we can signify: the relation of all tones to one another, regardless of occasional occurrences, assured by circumstance of a common origin.

I believe, to be sure, that this interrelationship of all tones exists not only because of their derivation from the first thirteen overtones of the three fundamental tones, as I have shown, but that, should this proof be inadequate, it would be possible to find another.'³⁶³

In identifying overtones as the underlying source of 'interrelationship of all tones', Schoenberg evokes *Klangverwandtschaften* by another name. The 'common origin' referred to is a web of overtone relationships between the notes of the chromatic scale, explained at length earlier in the same article.³⁶⁴ But whilst Schoenberg acknowledges the truism that the lower overtones are 'more easily perceptible',³⁶⁵ his decision to select the first 13 overtones of the first, fourth and fifth degrees of a diatonic scale is transparently contrived for the purposes of his argument: it does not accurately represent what we hear. For example, from Schoenberg's chart reproduced below, upon hearing a simple C-C# dyad (red), it is highly improbable that, were C a tonic, we would hear C# as the 11th partial of C's dominant, G – the closest possible relation, according to the diagram. The C#'s only justification would appear to have been Schoenberg's desire to include all twelve pitch-classes in the chart, in a circular attempt to prove his own prior conclusion regarding 'interrelationship':

1	2	3	4	5	6	7	8	9	10	11	12	13
C	C	G	c	e	g	bb	c	d	e	f#	g	ab
F	F	C	f	a	c	eb	f	g	a	b	c	db
G	G	D	g	b	d	f	g	a	b	c#	d	eb

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NB: shaded boxes indicate fundamentals.

NB: bold type indicates the lowest partial at which any given pitch-class occurs. The justification for running to the 13th partial appears to have been to include Ab.

³⁶² See footnote 360 above.

³⁶³ Schoenberg, Arnold: 'Problems of Harmony' [1934] in *Perspectives of New Music*, vol.11, n°2 (Spring-Summer 1973), p.20.

³⁶⁴ Ibid., pp.5-8.

³⁶⁵ Ibid., p.6.

³⁶⁶ Ibid., p.6. The grid, bold type, colour, shading and formatting are my own. Otherwise, the chart is Schoenberg's.

Thus, in response to Schoenberg's final sentence quoted above, I submit that his attempt at proof is indeed, to borrow his own term, 'inadequate'. However, his intuition was not nearly as far wrong as it would seem, both logically and from much of his harmonic practice. I submit that Chapters 5-6 of this paper, together with every chordal sonority within my composition portfolio, collectively amount to genuine proof *of something closely related*.

Schoenberg mistakenly assumed that the *Klangverwandtschaften* (or in his terms, 'inter-relationship(s)') would *automatically* be audible between any and all tones, in any possible vertical and horizontal combinations. The error lies at the very heart of the harmonic unintelligibility of much of Schoenberg's ostensibly 'atonal' music: the problem was not serialism per se, but this. That is: serialism, in the hands of Schoenberg and many others, may have compounded the problem, but was not its original cause. Like me, Reti also explicitly challenges Schoenberg's 'theory of "remote overtones"',³⁶⁷ albeit via a different route. In the process, Reti implicitly annuls the conception of pantonality that the overtone theory underpins.³⁶⁸ On one level, Reti was right to do so: with certain exceptions among his late works,³⁶⁹ Schoenberg's hypothetical 'pantonality' is not, on the whole, readily audible in his music. And yet Schoenberg was far closer to the truth than Reti realised.

As we have seen, in contrast to Schoenberg, my harmonic methods are founded on the premise, arrived at after many years of trial and – mostly – error, that whilst every *set of pitch-classes* within equal temperament does indeed possess *Klangverwandtschaften*, these are only latent. A composer

³⁶⁷ Reti, Rudolph: op.cit. (1958), p.39.

³⁶⁸ Implicitly, since – as previously stated – Reti never directly acknowledges Schoenberg's use of the term 'pantonality' at all.

³⁶⁹ Keller (1959) maintains that Schoenberg's late music 'began to show well-defined tonical implications',³⁷⁰ thereby retrospectively justifying the term 'pantonal' coined many years previously. This is largely true of *Ode to Napoleon Buonaparte* (1942)³⁷¹ and the *Piano Concerto* (1942),³⁷² only intermittently true of the *String Trio* (1946)³⁷³ and *Psalm 130 'De Profundis'* (1950),³⁷⁴ and largely untrue of the *Phantasy* (1949).³⁷⁵ On the strength of what supporting evidence there is among the late works, Keller endorses Schoenberg's definition of 'pantonality' as 'the synthesis of all tonalities that occurs in atonality (a word he always rejected)'.³⁷⁶

My contention is that one cannot take such a synthesis for granted. It only exists where the composer can render it clearly audible. Moreover, I submit that within Schoenberg's late works, 'tonical implications' are mostly the result of bringing out those elements among the generative 12-note rows that happen to possess obvious diatonic qualities in themselves, such as major and minor triads. They are not the result of technical advances that facilitate similar gravitational clarity *across the 4,096*.

³⁷⁰ Keller, Hans: op.cit. (1959), p.31.

cannot take them for granted: they must be actively earned. That is, they will never be audible, other than sporadically and by accident, unless the composer specifically looks to bring them to the surface, within every chord, every gesture, every melodic line and every texture. Past this point, it is simply a question of harmonic technique. Therefore, one might perhaps view my approach to harmony as an aurally coherent realisation of the pantonality that is theoretically present, but often musically unintelligible, in Schoenberg's compositions.

Between Schoenberg and Reti, the term 'pantonality' was used in a third, independent sense by George Russell, as one of many idiosyncratic terms in what, within jazz circles, has been a highly influential publication – *The Lydian Chromatic Concept of Tonal Organization* ([1953] 2001).³⁷⁷ Russell considers the 'two opposite poles of equal temperament, tonality (protonicity) and chromaticism (atonicity)'.³⁷⁸ He defines a 'pantonic state' as a polymodal expansion of a 'protonic state'.³⁷⁹ This, too, would suggest a link with aspects of my own practice. Many of my melodic techniques are intrinsically polymodal; among the excerpts examined in this paper, b.228-236 (pp.29-30) of *Madame de Meuron*³⁸⁰ and b.108-120 (pp.17-19) of *Velvet Revolution*³⁸¹ provide clear illustrations. Even my polychordal approach to spacing any given *set of pitch-classes* could be considered a vertical application of an essentially similar principle. Indeed, terminological idiosyncrasies notwithstanding, taken in isolation, the sense in which Russell uses the term would

³⁷¹ Schoenberg, Arnold: *Ode to Napoleon Buonaparte*, op.41 [1942], online audio (1.5.2012): <<https://www.youtube.com/watch?v=yZdsOHRDMEA>>.

³⁷² Schoenberg, Arnold: *Piano Concerto*, op.42 [1942], online audio (27.6.2012): <<https://www.youtube.com/watch?v=rZIB2tRyvQw>>.

³⁷³ Schoenberg, Arnold: *String Trio*, op.45 [1946], online video (17.12.2012): <https://www.youtube.com/watch?v=L_yCNIXjJGo>.

³⁷⁴ Schoenberg, Arnold: *Psalm 130 "De Profundis"*, op.50b [1950], online audio (3.1.2009): <<https://www.youtube.com/watch?v=2uYDme3bnQ>>.

³⁷⁵ Schoenberg, Arnold: *Phantasy for violin and piano*, op.47 [1949], online video (25.2.2014): <<https://www.youtube.com/watch?v=Cp88glYkbtU>>.

³⁷⁶ Keller, Hans: op.cit. (1959), p.31.

³⁷⁷ Russell, George: *The Lydian Chromatic Concept of Tonal Organization, Volume One: The Art and Science of Tonal Gravity*, Brookline, Massachusetts: Concept Publishing Co. ([1953] 2001).

³⁷⁸ Ibid., p.150.

³⁷⁹ Ibid., p.128.

³⁸⁰ See this paper, pp.117-120.

³⁸¹ See this paper, pp.132-135.

seem unproblematic.³⁸² But Russell's specific discussion of 'pantonicity' does not extend much further than this – the term does not occupy a central position in his theory.

Schoenbergian, Retian and Russellian pantonicity each foreshadow aspects of my approach to harmony. However, serialism aside, I did not devise any aspect of my harmonic method in response to any of the three composer-theorists. As previously stated, I have adopted a *stance* to composing with the 4,096³⁸³ that could arguably qualify as 'pantonal' in any of the three senses defined above.

In the bigger picture, the term 'pantonal' has occasionally surfaced in connection with the music of certain composers active long after the deaths of Reti and Schoenberg. Notable figures among these have included: 1) Ligeti³⁸⁴ – in relation to the late works, in the *Schoenbergian* sense; 2) Messiaen³⁸⁵ – in the *Retian* sense; and 3) Takemitsu³⁸⁷ – in the *Russellian* sense. On paper, these three divergent uses of the same term, built on three distinct, equally uncertain theoretical foundations – significantly weaken any potential case for a common 'pantonal' principle, let alone the 'common practice'³⁸⁸ that some had hoped for.³⁸⁹ And yet in musical reality, there are numerous interconnections. One is the unmistakable harmonic influence of the possibly *Retian* pantonicity of

³⁸² Numerous problems surface elsewhere in Russell's text, but none pertain to the present discussion.

³⁸³ See this paper, pp.10-11, including footnote 54, p.11.

³⁸⁴ Searby, Michael: *Ligeti's Stylistic Crisis: Transformation in His Musical Style, 1974–1985*, Lanham: The Scarecrow Press (2010), p.18.

³⁸⁵ Lewis, Charles R.: *An Investigation of Rudolph Reti's Concept of Pantonicity: Olivier Messiaen's Méditations Sur Le Mystère de la Sainte Trinité, a Test Case*, unpublished doctoral dissertation, Tallahassee: Florida State University (1985).

At the time of writing, I do not have access to this text. From Lewis's title alone, one may reasonably presume, without making any further assumptions about the precise line of enquiry, still less any conclusions drawn, that he has explored in considerable depth the possibility of applying the label 'pantonal', in the Retian sense, to the work in question.³⁸⁶

³⁸⁶ Messiaen, Olivier: *Méditations Sur Le Mystère de la Sainte Trinité* [1969], online audio (9.2.2017): <<https://www.youtube.com/watch?v=rZXWkaLVWSg>>.

³⁸⁷ Takemitsu described his own harmony as 'pantonal' on several occasions. One such instance is cited in Burt, Peter: 'Takemitsu and the Lydian Chromatic Concept of George Russell', in *Contemporary Music Review*, vol.21, n°4 (2002), p.107. Burt establishes that the sense in which Takemitsu employed the term can only have been derived from Russell (*ibid.*, pp.73-74.)

³⁸⁸ Kraehenbuehl, David: Review of *Tonality, Atonality, Pantonicity* by Rudolph Reti, in *Journal of Music Theory*, vol.3 n°1 (Apr. 1959), p.162: 'We can only hope that this book will be regarded, as it should be, as a pioneering attempt in an area of musical practice which will ultimately give rise to a series of much more specific and significant theoretical accounts of a new common practice.'

³⁸⁹ Similar hopes are expressed in Reti, Rudolph: *op.cit.* (1958), pp.4, 117-119 and 126-130.

Messiaen on the arguably *Russellian* pantonality of Takemitsu. Another is the influence of Bartók – one of the models for Reti’s definition – on the perhaps *Schoenbergian* pantonality of Ligeti’s late practice. Moreover, Messiaen, Takemitsu and the late Ligeti of the *Horn Trio* (1982)³⁹⁰ onwards have each significantly influenced my own harmonic methods. Had either Schoenberg or Reti arrived at a more watertight definition, or had Russell somehow expanded on his own definition with a precision seldom found elsewhere in his writing, the term would surely have come to serve far more usefully than it presently does.

I advance that a post-Schoenbergian, post-Retian and post-Russellian pantonal approach *to the 4,096*, then, pursues two objectives. Firstly, within the *varietà* of the 4,096, the composer aims to render the harmonic ‘interrelationship of all tones’³⁹¹ genuinely audible in practice. I propose that the technical foundation for this must lie in systematically bringing multiple, latent chordal roots to the sounding surface, above all via polychordal spacing. That is: from a wide exposure to ostensibly ‘atonal’, ‘non-tonal’ and ‘post-tonal’ music, I have yet to hear another, comparably effective means of achieving this first objective. Secondly, the composer seeks to consistently achieve a degree of harmonic euphony comparable to that which any competent *diatonic* composer can take for granted, but which is far more difficult to achieve with the full 4,096, since – strictly on a pitch-class level – most of that harmonic material possesses substantially greater sensory dissonance.

A pantonal approach, in the sense defined here, did not die out with Messiaen, Takemitsu and Ligeti³⁹² – still less with the earlier styles of music identified by Reti as ‘pantonal’. Notable works composed within the last 20 years or so which display evidence of pantonal thought, either within certain passages or throughout, include Augusta Read Thomas’s *Six Piano Etudes* (1996-2005),³⁹³

³⁹⁰ Ligeti, György: *Horn Trio* [1982], online video (20.10.2014): <<https://www.youtube.com/watch?v=gQTNE4P3qU>>.

³⁹¹ Schoenberg, Arnold: op.cit. ([1934] 1973), p.20. See also this paper, pp.158-161.

³⁹² Among other composers from that era discussed elsewhere in this paper, I am tempted to add Lutosławski to this list. See this paper, pp.60-63.

³⁹³ Thomas, Augusta Read: *Six Piano Etudes* [1996-2005], online video (9.5.2017): <<https://www.youtube.com/watch?v=x81dNv19QXc>>.

Magnus Lindberg's *Gran Duo* (2000),³⁹⁴ Oliver Knussen's *Violin Concerto*, op.30 (2002),³⁹⁵ HK Gruber's *Hidden Agenda* (2006),³⁹⁶ Thomas Adès's *Tevot* (2007),³⁹⁷ Fred Lerdahl's *String Quartet n°3* (2008),³⁹⁸ the late Steven Stucky's *Silent Spring* (2011),³⁹⁹ Erkki-Sven Tüür's *Flamma* (2011),⁴⁰⁰ Per Nørgård's *Symphony n°8* (2011),⁴⁰¹ Dai Fujikura's *Diamond Dust – Piano Concerto n°2* (2012),⁴⁰² Wolfgang Rihm's *IN-SCHRIFT 2* (2013),⁴⁰³ Kaija Saariaho's *Trans* (2015),⁴⁰⁴ Julian Anderson's *Incantesimi* (2016)⁴⁰⁵ and Helen Grime's *Violin Concerto* (2016).⁴⁰⁶ Some of these works extend significantly across the 4,096; others rather less so. Both Adès's *Tevot* and Stucky's *Silent Spring* steer into diatonicism at certain junctures. Fujikura's *Diamond Dust* and Lerdahl's *String Quartet n°3* include non-tonally-conceived stretches. Saariaho's *Trans* inhabits a very different harmonic world to earlier scores such as *Verblendungen* (1984)⁴⁰⁷ and *Nymphea* (1987),⁴⁰⁸ discussed elsewhere in this paper. Grime's *Violin Concerto* perhaps shows the closest point of contact with my current harmonic practice, in her approach to chordal spacing. That said, despite some clear technical links

³⁹⁴ Lindberg, Magnus: *Gran Duo* [2000], online audio (20.5.2011): <<https://www.youtube.com/watch?v=jTQLvOI6JEM>>.

³⁹⁵ Knussen, Oliver: *Violin Concerto*, op.30 [2002], online audio: <https://www.youtube.com/watch?v=LCP_GgYGfPQ>, <<https://www.youtube.com/watch?v=XpzA2mqkDcY>>, <<https://www.youtube.com/watch?v=lzY2tWkf6al>>.

³⁹⁶ Gruber, Heinz Karl: *Hidden Agenda* [2006], online audio (1.3.2016): <<https://www.youtube.com/watch?v=TZHngbxZFfk>>.

³⁹⁷ Adès, Thomas: *Tevot* [2007], online audio (18.6.2011): <https://www.youtube.com/watch?v=S_vVN7ONPnc>.

³⁹⁸ Lerdahl, Fred: *String Quartet n°3* [2008], online audio (14.6.2014): <<https://www.youtube.com/watch?v=q1RBg-DipeQ>>.

³⁹⁹ Stucky, Steven: *Silent Spring* [2011], online audio (14.5.2014): <<https://www.youtube.com/watch?v=V6uuvHfuyUw>>.

⁴⁰⁰ Tüür, Erkki-Sven: *Flamma* [2011], online audio (20.1.2013): <<https://www.youtube.com/watch?v=8q3N5YawFqM>>.

⁴⁰¹ Nørgård, Per: *Symphony n°8* [2011], online video (20.9.2012): <<https://www.youtube.com/watch?v=gylkRY5Bmks>>.

⁴⁰² Fujikura, Dai: *Diamond Dust – Piano Concerto n°2* [2012], online video (28.1.2015): <https://www.youtube.com/watch?v=P84nx_W32zs>.

⁴⁰³ Rihm, Wolfgang: *IN-SCHRIFT 2* [2013], online audio (7.12.2014): <<http://5against4.com/2014/12/07/wolfgang-rihm-in-schrift-ii-world-premiere/>> FLAC file (scroll down).

⁴⁰⁴ Saariaho, Kaija: *Trans* [2015], online audio (15.4.2017): <<https://www.youtube.com/watch?v=U8V-FSeewlw>>.

⁴⁰⁵ Anderson, Julian: *Incantesimi* [2016], online audio (11.10.2016): <<https://www.youtube.com/watch?v=LMIDQJxcPmg>>.

⁴⁰⁶ Grime, Helen: *Violin Concerto* [2016], online audio (20.12.2016): <<https://www.youtube.com/watch?v=vK4hRmTVV0c>>.

⁴⁰⁷ See this paper, p.28.

⁴⁰⁸ See this paper, p.5.

to both Grime and Knussen⁴⁰⁹ – links which can be traced back to the influence of an earlier generation of composers, including Messiaen, Lutosławski and Takemitsu –, my music does not possess especially close stylistic kinship to any of the works listed above.

It would be categorically wrong to assume that those composers who adopt a broadly pantonal approach to the 4,096 will necessarily produce better harmony – let alone better music, or even more accessible music⁴¹⁰ – than those who adopt an atonal, non-tonal or post-tonal stance. There are contemporary composers who could not have featured in the list above, whose music resonates just as deeply with me. Among living composers mentioned elsewhere in this paper, the work of George Benjamin, Harrison Birtwistle, Unsuk Chin and Tristan Murail is immensely important to me. The same is true of the earlier work of Saariaho, likewise conceived from a consistently non-tonal stance. But on a purely harmonic level, a pantonal approach invites solutions across the full available range of equal temperament that I find profoundly and immediately rewarding, in ways that other approaches to similar pitch-class terrain rarely seem to match.⁴¹¹ That is not necessarily to say that I regard each of the works cited in the previous paragraph to be uniformly successful in that respect. And indeed, some of those works do not venture especially far into that harmonic terrain. To my ears and mind, it is those works that seek out the maximum harmonic *varietà*, and rise to that formidable challenge with the maximum lucidity and euphony, that point the most exciting way forward.

⁴⁰⁹ See this paper, pp.91-95.

⁴¹⁰ 'Better' and 'more accessible' are of course not synonymous. Both matter.

⁴¹¹ Certain superb chordal sonorities in the works of Grisey, Murail and other composers of the French spectral school constitute an obvious exception. Evidently, such sonorities typically extend beyond equal temperament. But they evidently feature very strong *Klangverwandtschaft*. Creatively, I would above all be interested in how the roots of such sonorities might be managed on a short-term, chord to chord level, to produce aurally intelligible progressions. The progression between bars 412-435 (pp.30-31) of *The Art of Thinking Clearly* is perhaps very roughly comparable. The chords were not spectrally conceived, but in one or two instances, the interplay of *Klangverwandtschaften* possibly sparks something approximately similar. Perhaps, concerning such chords, the two most essential differences between the French spectral approach and mine are as follows: 1) I hear latent *Klangverwandtschaft* in every conceivable *set of pitch-classes*, subject to spacing, 2) I look beyond using chords as *objets sonores*, to exploit them more flexibly and actively within a more clearly-defined harmonic grammar.

To conclude this study of the pantonal stance, we shall consider an excerpt from the final paragraph of Peter Burt's article, 'Takemitsu and the Lydian Chromatic Concept of George Russell' (2002):

'[Takemitsu's] "pantonalism" ... was intended as a "humble protest against inorganic serialism."⁴¹² In this, his... subversive project seems... to have proved... successful... The "inorganic serialism" that seemed so unassailably the dominant idiom of the epoch when Takemitsu wrote *The Dorian Horizon* [1966]⁴¹³ has indeed been relegated to the status of those wrong turnings and cul-de-sacs in which the history of Western composition in the twentieth century so plentifully abounds.'⁴¹⁸

I contend that both Takemitsu and Burt sell 'pantonalism' short. A pantonal approach to the 4,096, in the specific sense defined above and illustrated throughout this paper and portfolio, can do much better than simply serve as a 'humble protest against inorganic serialism' – with hindsight, now something of a platitude, given the torrent of criticism that serialism has endured, from so many and for so long.⁴¹⁹ Far above and beyond that, a certain form of 'pantonalism' can singlehandedly transform certain forms of serialism into genuinely compelling, beautiful, *even organic* harmonic shapes, in my compositions at least. In the process, it can rescue serialism from the status of a would-be cul-de-sac. And that would be a far nobler thing.

⁴¹² Takemitsu, Tōru, quoted in Akiyama, Kuniharu: 'Article on *The Dorian Horizon*', in *Saishin meikyoku kaisetsu zenshū*, vol.13, Tokyo: Ongaku no Tomo Sha (1980), p.455.

⁴¹³ Burt asserts that *The Dorian Horizon* (1966)⁴¹⁴ is 'the Takemitsu score in which the debt to Russell's theories is most explicitly acknowledged'.⁴¹⁵ Burt specifically identifies 'Russell's... aesthetic ideas about "pantonicity"'⁴¹⁶ as one of two areas in which this influence 'may have had a... far-reaching impact'.⁴¹⁷

⁴¹⁴ Takemitsu, Tōru: *The Dorian Horizon* [1966], online audio (17.6.2012): <<https://www.youtube.com/watch?v=DuzFWIUAgjM>>.

⁴¹⁵ Burt, Peter: op.cit. (2002), p.73.

⁴¹⁶ Ibid., p.107.

⁴¹⁷ Ibid., p.107.

⁴¹⁸ Ibid., pp.107-108.

⁴¹⁹ See this paper, pp.15-17, 101-102, 116 and 126.

13. Epilogue: Harmony and Impact

'The music produced under those hothouse conditions has been heard by few and has had next to no social impact.'⁴²⁰

Susan McClary's influential and provocative 'Terminal Prestige: The Case of Avant-Garde Music Composition' (1989) does not feature the word 'harmony'. Indeed, the first ten pages make no mention of pitch. There is then a passing nod to 'neo-tonal composers'⁴²¹ in the main body of the text; a single reference to 'tonal music'⁴²² within a quotation from David Epstein, whom McClary subsequently takes to task; and two dismissive references to 'pitch cells',⁴²³ implying that 'structuralist'⁴²⁴ musicologists such as Epstein ought really to concentrate their energies on more worthy subjects. Two of the numerous references cited happen to feature the word 'tonality'⁴²⁵ in their titles. That is all.

Rather than consider harmony, McClary rails against 'the kind of complexity that listeners by and large find incomprehensible',⁴²⁶ 'avant-garde music's... illusion that it had transcended social context altogether',⁴²⁷ and the 'misogynist content' that 'much of the avant-garde musical repertory... both flaunts and conceals'.⁴²⁸ But there is compelling evidence to suggest that harmony is, at the very least, a strong contributing factor towards the low 'social impact' of most of the music that embraces the 4,096. On the most straightforward level: the diatonic and modal works of Steve Reich, Philip Glass, Arvo Pärt, John Adams, Michael Nyman and Ludovico Einaudi have won over a

⁴²⁰ McClary, Susan: 'Terminal Prestige: The Case of Avant-Garde Music Composition' in *Cultural Critique*, n°12, 'Discursive Strategies and the Economy of Prestige' (Spring, 1989), p.64.

⁴²¹ Ibid., p.67.

⁴²² Ibid., p.69.

⁴²³ Ibid., p.70.

⁴²⁴ Ibid., p.70.

⁴²⁵ Ibid., pp.67 and 69.

⁴²⁶ Ibid., p.58.

⁴²⁷ Ibid., p.63.

⁴²⁸ Ibid., p.74.

large audience, whilst, for the most part, ostensibly ‘atonal’, ‘non-tonal’ or ‘post-tonal’ music has attracted far fewer listeners.

Of course, I am one of that smaller crowd. I care passionately about this body of music – its unprecedented capacity for *varietà*,⁴²⁹ and the extraordinary new realms of musical expression to which it thereby gains access. I sincerely hope that this category of music can eventually win over a significantly larger audience; this could only be a good thing for society. However, genuine enthusiasm for the music in question does not preclude reservations concerning the harmonic aspect in specific instances. In that respect, my position is comparable to that of Bob Gilmore, who as an ardent devotee, nonetheless has described his own struggles to apprehend some ‘atonal’, ‘non-tonal’ or ‘post-tonal’ harmony as a listener:

‘I believe that of all the parameters of music it is harmony that has taken the hardest knocks...

...[This] first became a problem with respect to non-tonal music...

I suspect many listeners – perhaps even the majority – experience something... [close] to what I experience: the harmonic incomprehensibility, or semi-comprehensibility, of some new music, where I can’t fathom the logic of pitch choice even after several attempts, only dulls my perception. Frustrated in the attempt to understand the music harmonically, I slip into more passive, less demanding modes of listening, letting the music do its thing and abandoning the difficult task of really trying to follow it. Is this a problem? Maybe not, if the music is still enjoyable to listen to. But it seems to me that in such circumstances what I experience is a form of mental laziness, akin to giving up the struggle to follow an intricate philosophical text and simply admiring the choice of font or enjoying the smell of the pages in the book.’⁴³⁰

It does not follow that music in which the harmonic discourse remains largely unclear to the listener⁴³¹ cannot also be worthwhile. Gilmore takes great care to emphasise this point, affirming his own enjoyment of many ‘atonal’, ‘non-tonal’ or ‘post-tonal’⁴³² works ‘even though [in some pieces,] much of the time I draw a blank at what’s going on harmonically’.⁴³³ My own listening experience is

⁴²⁹ See this paper, pp.1-2.

⁴³⁰ Gilmore, Bob: ‘NMC Friend and Musicologist Bob Gilmore shares his thoughts on listening’, in *NMC Recordings* Feature, [2014] 5 January 2015 [online]. <<https://www.nmcrec.co.uk/news/bob-gilmore-1961-2015>>. NB: no page breaks or numbers.

⁴³¹ I contend that this is one of two factors. The other is the problem of harmonic euphony, given the preponderance of sensory dissonances, when one considers the 4,096 as chords. As we have seen, both factors are surmountable.

⁴³² Gilmore, Bob: op.cit. ([2014] 2015). Gilmore uses the three terms interchangeably.

⁴³³ Ibid.

somewhat similar: I too enjoy much of this music, despite those instances, in some works, where I am not wholly convinced by some aspect of the harmony.

Gilmore's suspicion that 'many listeners – perhaps even the majority –' are, like him, 'frustrated' by the harmonic element of a certain proportion of the music that explores the 4,096 suggests a plausible cause for its relatively modest 'social impact', hitherto. More plausible, to my mind, than the notion implied by McClary that composers might begin from a misanthropic – even specifically 'misogynist' – position, and proceed to adopt complex, inaccessible musical idioms so as to deliberately alienate listeners and thereby escape 'social context'. Are these composers not simply motivated by the desire to explore a new and exciting mode of musical expression?

I advance that 'terminal prestige', in the form of various pronouncements by Schoenberg, Roger Sessions, Milton Babbitt and others,⁴³⁴ rightly exposed by McClary as absurd posturing, is a defence mechanism by which these composers have sought to dismiss the audience indifference that can follow from the 'frustrations' that Gilmore identifies. That is, I submit that 'terminal prestige' is simply an outward symptom of deeper underlying problems that pertain, above all, to harmony.

I reiterate my enthusiasm for a wide range of ostensibly 'atonal' music, including many works that remain thoroughly uncompromising in harmonic terms, and my hope that – one way or another – this music will eventually attract more listeners than hitherto. But equally, I advance that by widening and strengthening the range of available harmonic techniques and approaches aimed at rendering the 4,096 both euphonious and readily comprehensible to listeners, one can only improve the odds of a possible, eventual upturn in the social impact of the music in question. If any one of the harmonic techniques that I have developed and explained in this paper can genuinely help towards that end, my research will have had some degree of meaningful social impact.

⁴³⁴ Quoted in McClary, Susan: *op.cit.* (1989), pp.58-59.

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Appendix: Notes on the Recordings

Of the six scores submitted, only two are accompanied by recordings. The recording of *Nevermore* is by the New Music Players, conducted by Ed Hughes (25.9.2015). The recording of *Velvet Revolution* is by the London Sinfonietta, conducted by Garry Walker (22.8.2014).

I remain grateful to have heard *Nevermore* performed. Within the context of this submission, I wish to draw the reader-listener's attention to certain details:

- The average tempo of the recording is approximately quaver = 93 (dotted crotchet = 31). This is significantly slower than the tempo indicated – quaver = 120 (dotted crotchet = 40).
- The conductor chose to bend the tempo at certain points. Some of the consequences may be ascertained by following what were conceived as *moto perpetuo* clarinet lines at b.63-66 (p.5)⁴³⁵ and b.122-130 (pp.10-11).⁴³⁶
- Wrong notes are played at three vital junctures. First, a D# instead of a D, b.48-49 (p.4).⁴³⁷ Second and third, a C# instead of a C, and a D# instead of a D, b.95-98, (p.8).⁴³⁸ Evidently, these affect the harmony.

Likewise, I remain grateful to have heard *Velvet Revolution* recorded. Within the context of this submission, the following details should be noted:

- Despite having been marked one dynamic notch lower than the rest of the woodwind, in some passages, the soprano saxophone is unduly loud, given its textural and harmonic role, obscuring several essential voices. The passages most affected are b.121-125 (pp.19-

⁴³⁵ *Nevermore* – audio file, 2:07-2:16.

⁴³⁶ 3:54-4:10.

⁴³⁷ 1:39-1:43.

⁴³⁸ 3:05-3:12.

20),⁴³⁹ b.137-141 (p.22)⁴⁴⁰ and b.146-178 (pp.23-29),⁴⁴¹ where we do not hear the harmony as we should.

- The vibraphone begins b.196 (p.32) a beat early, and remains a dotted crotchet ahead of the rest of the ensemble until the end of b.197.⁴⁴² Evidently, again, this affects the harmony.

⁴³⁹ *Velvet Revolution* – audio file, 3:30-3:35.

⁴⁴⁰ 3:55-4:03.

⁴⁴¹ 4:09-4:51.

⁴⁴² 5:14-5:22.